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ABSTRACT

This publication provides the evaluation policies, procedures, and standards to which an auto body technician training program must adhere to be granted certification by the National Institute for Automotive Service Excellence. The policies section has three parts: the automobile areas that may be certified and-minimum requirements for certification; information about evaluation team leaders, on-site evaluation team members, task lists, tools and equipment, and automobile program evaluation; and discussion of policies on articulation agreements, recognition for certification, appeals and action for revocation. The procedures section provides an overview of the process for certification. The next section contains the 10 program standards in these areas: purpose, administration, learning resources, finances, student services, instruction, equipment, facilities, instructional staff, and cooperative agreements. The task list follows. Lists of assumptions and definitions are provided. The tasks are divided into the following: structural analysis and damage repair, nonstructural analysis and damage repair, mechanical and electrical components, plastics and adhesives, and painting and refinishing. Lists are also provided of applied academics (language arts and communications, mathematics, science) and workplace skills. The final section lists tools and equipment, including general shop equipment and safety items, hand tools, and specialty tools and equipment. (YLB)

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ED 391 006

ASE PROGRAM CERTIFICATION STANDARDS

Collision Repair & Refinish

Administered By:

National Automotive Technicians Education Foundation (NATEF)
13505 Dulles Technology Drive, Suite 2
Herndon, VA 22071-3421
(703) 713-0100

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ASE PROGRAM CERTIFICATION STANDARDS

FOR

COLLISION REPAIR & REFINISH TECHNICIAN TRAINING PROGRAMS

Administered By:

National Automotive Technicians Education Foundation (NATEF)
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TABLE OF CONTENTS

Policies

Collision Repair & Refinish Technician Training Certification Program . . . 1
Collision Repair & Refinish Minimum Requirements . . . 2
Information About Evaluation Team Leaders (ETLs) . . . 5
Information About On-Site Evaluation Team Members . . . 6
Task List Information 7
Tools And Equipment Information 8
Collision Repair & Refinish Program Evaluation . . . 9
NATEF Policies on Articulation Agreements. 10
Recognition For Certification 13
Appeals And Action For Revocation 14

Procedures

Process Overview 16
On-Site Evaluation Cost Sheet 19

Program Standards

Standard 1 - Purpose 20
Standard 2 - Administration 20
Standard 3 - Learning Resources 21
Standard 4 - Finances 22
Standard 5 - Student Services 22
Standard 6 - Instruction 23
Standard 7 - Equipment 25
Standard 8 - Facilities 26
Standard 9 - Instructional Staff 27
Standard 10 - Cooperative Agreements 28

Task List

Task List Information 29
Assumptions 30
NATEF Task List 31
Structural Analysis And Damage Repair 31
Non-Structural Analysis And Damage Repair . . . 35
Mechanical And Electrical Components 40
Plastics And Adhesives 50
Painting And Refinishing 51

Tools And Equipment

Tools And Equipment 58
General Shop Equipment And Safety Items 59
General Shop Equipment 59
Special Safety Items 60
Student Hand Tools 60
Common Hand Tools 60
Body Working Tools 63
Additional Tools & Equip. Required For Specialty Areas 64
Structural Analysis And Damage Repair 64
Non-Structural Analysis And Damage Repair . . . 64
Mechanical And Electrical Components 65
Plastics And Adhesives 65
Painting And Refinishing 65

POLICIES

COLLISION REPAIR & REFINISH
TECHNICIAN TRAINING CERTIFICATION PROGRAM

The Board of the National Institute for Automotive Service Excellence (ASE) is the responsible body for the Autobody Technician Training Certification Program. ASE will grant certification to programs that comply with the evaluation procedure, meet established standards, and adhere to the policies in this document.

The Certification Program is under the direct supervision of the Board of Trustees of the National Automotive Technicians Education Foundation (NATEF) and such personnel who are designated or employed by the Foundation.

The purpose of the Autobody Technician Training Certification Program is to improve the quality of training offered at the secondary and post-secondary levels. NATEF does not endorse specific curricular materials nor provide instruction to individuals, groups or institutions. It does, however, set standards for the content of instruction which includes: tasks, tools and equipment, hours, and instructor qualifications.

The Program is a certification program only and it is <u>not</u> associated with the accreditation role of other agencies.

The cost to each program for certification will be as reasonable as possible to encourage program participation. This cost will include: self-evaluation materials, on-site team evaluation materials, and the honorarium and expenses of the Evaluation Team Leader (ETL).

The five Autobody areas that may be certified are:

1. Non-Structural Analysis and Damage Repair
2. Structural Analysis and Damage Repair
3. Mechanical and Electrical Components
4. Plastics and Adhesives
5. Painting and Refinishing

COLLISION REPAIR & REFINISH MINIMUM REQUIREMENTS

1. The minimum program requirements are identical for initial certification and for recertification.

2. A program may receive certification in:

   a. Painting and Refinishing (only)
   b. Structural Analysis and Damage Repair
      plus at least two of the following areas:
      Non-Structural Analysis and Damage Repair
      Mechanical and Electrical Components
      Plastics and Adhesives
      Painting and Refinishing
   c. All five autobody areas

3. A program providing instruction in <u>all</u> of the autobody areas must have a minimum total of 1,110 hours of combined laboratory/shop (coop) and classroom instruction.

a. Structural Analysis and Damage Repair	275*
b. Non-Structural Analysis and Damage Repair	200*
c. Mechanical and Electrical	260
d. Plastics and Adhesives	75
e. Painting and Refinishing	<u>300</u>
TOTAL HOURS	1,110

* Seventy-five (75) hours of GMAW (Mig) Welding is required for certification. It may be included in either Structural Analysis and Damage Repair or Non-structural Analysis and Damage Repair. The 75 hour requirement is included above in the hours shown for Structural Analysis and Damage Repair. However, the 75 hour requirement may be met by offering GMAW (Mig) Welding in Non-structural Analysis and Damage Repair. This option would reduce the hours required in Structural Analysis and Damage Repair to 200 and increase the hours required in Non-Structural Analysis and Damage Repair to 275. This will not affect the total 1,110 hour requirement.

Tasks related to the five autobody areas may be taught at different times during the course of study. Therefore, the hours for an individual area would be the sum total of all the hours of instruction related to the tasks.

4. **The average rating on Standards 6, 7, 8, and 9 must be a four (4)** on the five-point scale. The program will not be approved for an on-site evaluation if the average is less than a 4 on those Standards. The program should make improvements before submitting the application to NATEF for review. **A program will be denied certification if the on-site evaluation team average on Standards 6, 7, 8, and 9 is less than four.**

5. A program may not be approved for an on-site evaluation if the average rating on Standards 1 - 5 and 10 is less than a four (4) on the five-point scale. **A program may be denied certification if the on-site evaluation team average on Standards 1 - 5 and 10 is less than four.** Approval for on-site evaluation or certification will be made by NATEF, based on the number of Standards rated at 4 or 5 as well as the individual rating on any Standard rated below 4.

6. The instructor(s) must hold current ASE certification in the autobody area(s) they are teaching.

7. The program Advisory Committee must meet at least twice a year and have a minimum of 5 people on the committee. Minutes of the meetings must be provided for review by the on-site evaluation team.

8. High Priority items on the Task List are broken down into two categories, High Priority - Individual (HP-I) and High Priority-Group (HP-G). HP-I is defined as a task where students must be able to demonstrate competency to the instructor on an individual basis. HP-G is defined as a task that can be taught in a group setting (2 or more students) through the use of video, demonstration, etc. Students should be tested on the information presented, but are not required to demonstrate competency on an individual basis.

9. A total of 95% of the HP-I items and 90% of the HP-G items must be included in the curriculum.

10. A program that does not meet the minimum hour requirements may be eligible for certification if both of the following conditions are met in the program areas requesting certification:

    a. show evidence that all graduates from the previous academic year have taken the ASE certification examination, and
    b. show documentation that 75% of those graduates passed the ASE certification tests.

11. The concern for safety is paramount to the learning environment. Each task section has the following safety task preceding all related tasks included in the section:

Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. ..

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INFORMATION ABOUT EVALUATION TEAM LEADERS (ETLs)

Evaluation Team Leaders (ETLs) are educators who have been trained by NATEF to lead the on-site evaluation. The ETL will be assigned by the NATEF office once a program has been approved for an on-site evaluation. Every effort will be made to assign an ETL located closest to the school to reduce the cost for the evaluation. Two additional team members, selected by the program and approved by the ETL, are required for an autobody program on-site evaluation. (See the following page for additional information about team members.)

Persons selected as ETLs must have:

1. a minimum of six years of combined experience as an autobody technician and autobody instructor (at least three years experience as an autobody technician is required),
2. a B.A. or B.S. in Education from a college or university recognized for teacher training by the state, and
3. ASE certification in <u>all</u> autobody areas.

If a state does not employ autobody instructors with the preceding requirements, the following qualifications will apply:

1. six years experience as an autobody technician,
2. four years autobody teaching experience at the secondary, post-secondary or community college level, and
3. ASE certification in <u>all</u> autobody areas.

ETL training is valid for two years. However, automatic two-year renewal is granted every time an ETL conducts an on-site evaluation. ETLs are required to attend additional training sessions if they have not conducted an on-site evaluation in two years. This additional training is required even if the individual holds current ASE certification.

* Anyone interested in becoming an Evaluation Team Leader should contact the NATEF office at (703) 713-0100 or their State Supervisor for more details.

INFORMATION ABOUT ON-SITE EVALUATION TEAM MEMBERS

The program requesting certification is responsible for recruiting and recommending on-site evaluation team members. The ETL must approve individuals recommended by the program. The on-site evaluation team members must be practicing autobody technicians, service managers or shop owners from businesses in the area served by the training program.

Team members must have:

1. high school diploma or the equivalent (industry or military training may be considered as the equivalent), and
2. at least seven years full-time experience as a general autobody technician.

* ASE autobody certification is recommended but not required.

The Initial certification evaluation team and the Recertification evaluation team require the same number of individuals conducting the evaluation. They include the ETL and two on-site evaluation team members. Both team members must be from industry (one from a dealership and one from an independent repair facility). One alternate team member choice is to be identified on the On-Site Evaluation Team Member List in the event that one of the team members is unable to conduct the on-site evaluation. The alternate team member may be from either a dealership or from an independent repair facility.

Team members must not be advisory committee members, former instructors or graduates of the program within the past ten years.

TASK LIST INFORMATION

An essential element of any curriculum or training program is a valid task list. Autobody technician instructors need a well-developed task list that serves as a solid base for course of study outlines and facilitates communication and articulation of their training programs with other institutions in the region.

It is NATEF policy that the task list developed by the National Institute for Automotive Service Excellence (ASE) serves as the basis for the NATEF task list. Panels of technical service experts from the automotive service industry and vocational education are called upon to develop and validate the ASE and NATEF task lists. The ASE task list is also used to develop the ASE certification examination, a nationally recognized symbol of competence in diagnosing and repairing vehicle problems. Additional information on the development of the NATEF task list can be found in the Task List section.

The NATEF Autobody committee recommended that the "High Priority" tasks have an additional designation based on demonstration of competency. **High Priority - Group (HP-G) is defined as a task that can be taught in a group setting (2 or more students) through the use of video, demonstration, etc. Students should be tested on the information presented, but are not required to demonstrate competency on an individual basis. High Priority - Individual (HP-I) is defined as a task that requires students to demonstrate competency to the instructor on an individual basis.**

Certified programs must include 95% of the HP-I tasks and 90% of the HP-G tasks in the curriculum. Tasks not designated as HP-I and HP-G are additional tasks that may be included in the curriculum. Competency in HP-I tasks will indicate to employers that the graduate is skilled in that area. HP-G tasks will indicate to employers that the graduate has been tested on the information, but may not have "hands-on" competency skills.

TOOLS AND EQUIPMENT INFORMATION

The basic tools and equipment that must be available for use in the autobody program are listed in the Tools and Equipment section. Many tools and much of the equipment are the same for some or all of the program areas. However, some equipment is specialized and must be available for use in the selected program areas. These individual program area lists are included in the Tools and Equipment section.

The student hand tool list covers all program areas. This list indicates the tools a student will need to own to be successful in each of the specialty areas.

Although no brand names are listed, the equipment and tools must address the following programmatic issues:

1. Safety - Equipment and tools must have all shields, guards, and other safety devices in place and operable.
2. Type and Quality - The tools and equipment used in a certified program must be of the type and quality found in industry. They must also be adequate and in sufficient quantity to meet the program goals and student performance objectives.
3. Consumable Supplies - Supplies should be in sufficient quantity to assure continuous instruction. Consumable supplies, such as solvents, sand paper, etc. are not listed.
4. Maintenance - A preventative maintenance schedule should be used to minimize equipment down-time.
5. Replacement - A systematic schedule for replacement should be used to maintain up-to-date tools and equipment at industry and safety standards. Information gained from student program evaluations as well as advisory committee input should be used in the replacement process.
6. Inventory - An inventory system should be used to account for tools, equipment, parts, and supplies.
7. Parts Purchasing - A systematic parts purchasing system should be used - from work order to supplier.
8. Hand Tools - Each student should be encouraged to purchase a hand tool set during the period of instruction.
9. Storage - Adequate storage of tools should be provided. Space for storage of the students' hand tools should be provided.

COLLISION REPAIR & REFINISH PROGRAM EVALUATION

NATEF Standards for Initial Certification and Recertification are identical. Three items are critical for certification and are in **bold** print in the Autobody Program Self-Evaluation materials. These three items are:

2.5 A
6.5 A
7.1 A

Programs must be able to support a yes response for 2.5 A and 6.5 A. Programs must hold at least two working meetings of the Advisory Committee each year (2.5 A). In section 6.5 A, the programs must include the required percentage of the HP-I and HP-G tasks in the areas where certification is desired. Programs must also achieve a 4 on the 5-point scale on item 7.1 A. If these responses are not achieved, do not apply for certification at this time.

In addition, an on-site evaluation will not be scheduled unless the average score on Standards 6, 7, 8, and 9 is at least a 4 on the Autobody Program Self-Evaluation. Please refer to the Autobody Program Requirements for more information.

NATEF POLICIES ON ARTICULATION AGREEMENTS FOR ASE PROGRAM CERTIFICATION

In a number of states and localities technician training programs are able to meet ASE standards for certification only by establishing an articulation effort between secondary and post-secondary programs. Recent NATEF Trustee action, as well as language in the Carl D. Perkins Vocational Education Act, encourages articulation between programs at the secondary and post-secondary levels.

Articulation agreements encourage, but cannot require, graduates of secondary programs to go on to post-secondary education. Financial and social considerations suggest that many, perhaps most, graduates must seek employment upon graduation from high school.

Articulation agreements for Automobile, Autobody, and Medium/Heavy Truck technician training programs may involve two or more training centers at secondary and post-secondary levels or two programs at the secondary level. However, when programs articulate the following conditions must be met:

1. The minimum ASE specialty areas required in Automobile, Autobody, and Medium/Heavy Truck technician training programs must be included.

   Automobile: Brakes, Electrical/Electronic Systems, Engine Performance, and Suspension & Steering.

   Medium/Heavy Truck: Diesel Engines, Suspension & Steering, Brakes, Electrical/Electronic, and Preventive Maintenance Inspection.

   Autobody: Structural Analysis & Damage Repair plus at least two of the following areas:

   Non-Structural Analysis & Damage Repair,
   Mechanical & Electrical Components,
   Plastics & Adhesives,
   Painting & Refinishing

   (Note: A program may be certified in Painting & Refinishing only and would not be required to have an articulation agreement.)

2. Automobile and Medium/Heavy Truck programs must have a minimum of two required specialty areas to articulate with another program for ASE certification purposes.

3. Autobody programs must have Structural Analysis & Damage Repair

and one of the four optional program areas to articulate with another program for ASE certification purposes.

**** THE SIGNED, COPY OF THE ARTICULATION AGREEMENT MUST BE SUBMITTED IN EVERY CASE ALONG WITH THE SELF-EVALUATION MATERIALS. ****

4. The articulation agreement must be in writing and approved by the administration of both institutions. The agreement shall:

   a. List the areas of instruction to be offered by each training center.

   b. Stipulate how credit will be granted for successful completion of the instructional areas at each institution. This should also include the criteria for evaluating successful completion.

   c. Describe procedures for applying for credit at the post-secondary level for instruction received at the secondary level.

5. WHEN TWO OR MORE CENTERS ARE TO BE EVALUATED AT THE SAME TIME

   The procedures for submitting the self-evaluation materials and on-site team evaluation application are as follows:

   a. Each training center in an articulation agreement shall conduct a self-evaluation for the specialty areas at their training center. The center requesting the largest number of specialty areas to be certified shall be designated the lead center. If the participating centers are requesting the same number of areas certified, they will select one center as the lead center. The lead center will be responsible for submitting all self-evaluation materials including a cover letter and a signed, copy of the articulation agreement.

   b. When two or more centers under an articulation agreement are being evaluated at the same time they shall agree upon the selection of the on-site evaluation team members.

   c. The NATEF office must be informed of the number of training centers and specialty areas being evaluated. The number of centers and areas being evaluated may require additional members or additional days to complete the evaluation.

   d. The division of the local costs involved for the on-site evaluation is to be explained on the Application for On-Site Evaluation.

e. The curriculum for the articulated centers requesting certification shall be sent by the lead center to the Evaluation Team Leader assigned by NATEF.

6. WHEN ONE CENTER IS ALREADY CERTIFIED

The procedures for submitting the self-evaluation materials and on-site team evaluation application are as follows:

a. When a training center is entering into an articulation agreement with a center that is currently certified, the center that is not certified will submit the self-evaluation materials along with a signed, copy of the articulation agreement. The uncertified center will follow through with the total certification process.

b. The on-site evaluation team members will only evaluate the materials at the training center requesting certification.

c. The training center that is already certified will NOT be required to be evaluated until they are due to recertify their training program.

7. Articulated training centers may certify in one or more of the same specialty areas as long as they meet the minimum required areas jointly. For example, one automotive training center (Center A) may be certified in four or more areas, including the minimum required areas. The articulated automotive training center (Center B) may offer only two of the required areas. Center B would be eligible for certification only after articulating with Center A.

8. Each training center in an articulation agreement shall provide their graduates with a certificate identifying successful completion of instructional areas meeting ASE standards.

9. Certification shall be awarded for each articulated program. Each secondary and post-secondary program shall receive a plaque which will include specialty area plates only for instructional areas offered in their training center.

10. The certified plaque shall indicate the name of the training center and will include "articulated with _____ training center". This will clearly indicate that a training center may be certified in fewer than the required areas only when it articulates with another training center.

RECOGNITION FOR CERTIFICATION

A program approved for certification will receive a plaque that bears the ASE seal and the school's name. Individual plates will be attached to the plaque to identify the areas in which the program is certified. These will also include the expiration date of certification. Any program certified in all eight areas will receive a Master Certification plaque. A statement below the seal will read:

> "THE INSTRUCTION, COURSE OF STUDY, FACILITIES AND EQUIPMENT OF THIS INSTITUTION HAVE BEEN EVALUATED BY THE NATIONAL AUTOMOTIVE TECHNICIANS EDUCATION FOUNDATION AND MEET THE NATIONAL INSTITUTE FOR AUTOMOTIVE SERVICE EXCELLENCE STANDARDS OF QUALITY FOR THE TRAINING OF AUTOBODY TECHNICIANS IN THE FOLLOWING AREAS:
>
> _____
>
> _____
>
> _____"

Institutions receiving ASE certification are encouraged to put on the graduate's diploma or certificate the following statement:

> "The person holding this diploma has participated in an autobody technician training program that was certified by the National Institute for Automotive Service Excellence and has completed instruction in the following areas:
>
> _____
>
> _____
>
> _____"

A screened ASE/NATEF logo may be overprinted with the above statement and placed on the graduate's diploma. A camera ready logo is provided in the promotional material a program receives upon certification.

A program approved for recertification will receive a brass plate which reads "RECERTIFIED Exp. 19__".

Certified programs will also receive a 24"x30" sign indicating that the training program is ASE certified.

APPEALS AND ACTION FOR REVOCATION

APPEALS: PROGRAMS APPLYING FOR CERTIFICATION

A complaint received from any school concerning the procedures, evaluation or certification of the autobody technicians training program must be made in writing to the ASE office in Herndon, VA. It will be immediately referred to the Grievance Examiner who will acknowledge receipt of the complaint, in writing, to the complainants. Thereafter, the Grievance Examiner will investigate the complaint and prepare a report. A copy of the report will be given to the complainants and to an Appeals Committee within thirty (30) days of the receipt of the complaint.

The Appeals Committee will review the findings and recommendations of the Grievance Examiner, together with the complaint and any data supplied in connection therewith. The Appeals Committee will be empowered to dismiss the matter or to initiate such action as they may deem appropriate.

If the complainants desire to review the Appeals Committee's evaluation, they may do so at the office of the Grievance Examiner in Herndon, VA. However, they will not be permitted to make copies of the results.

ACTION FOR REVOCATION: ASE CERTIFIED PROGRAMS

The Appeals Committee will also advise the ASE President of its judgements and recommendations for action in any cases of malpractice or misrepresentation involving the misuse of ASE certification for an autobody technician training program. Upon receipt of a complaint alleging misuse or misrepresentation by a certified program, the Grievance Examiner will be notified. The Grievance Examiner will notify, in writing, the parties against whom the complaint has been filed, indicating the alleged wrongdoing. The parties will be further advised that they may submit a written explanation concerning the circumstances of the complaint within thirty (30) days. After the Grievance Examiner has considered the complaint and received the explanation, if any, the Grievance Examiner will determine whether there is a reasonable basis for a possible wrongdoing. If the Grievance Examiner finds such a basis, the Grievance Examiner will inform the parties of the findings. At that time, the Grievance Examiner will inform the parties of their right to a hearing before the Appeals Committee. The parties will have fifteen (15) days to notify the Grievance Examiner, in writing, of their decision.

In the event the involved parties elect to be bound by the findings of the Grievance Examiner without a hearing, the Grievance Examiner will submit a written report with recommendations to the Chairman of the Appeals Committee. This report will be submitted

within sixty (60) days of the receipt of the waiver of a hearing. The Chairman of the Appeals Committee will mail a copy of the Grievance Examiner's findings and recommendations to the parties.

In the event that the involved parties elect to appear at a hearing, the Chairman of the Appeals Committee will call a Board of Inquiry. This Board of Inquiry will consist of four ASE Board members, one from each of the following categories: Education, Public Interest, Service Employers, and Vehicle and Service Products Manufacturers. The Board of Inquiry will be convened in Herndon, VA at a date and time determined by the Chairman. The Board of Inquiry will notify the involved parties, in writing, regarding the time and place of the hearing.

The Grievance Examiner will be responsible for investigating and presenting all matters pertinent to the alleged wrongdoing to the Board of Inquiry. The involved parties will be entitled to be at the hearings with or without counsel. The parties will be given an opportunity to present such evidence or testimony as they deem appropriate.

The Board of Inquiry will notify the Chairman of the Appeals Committee of its findings and recommendations, in writing, ten (10) days after the hearing is completed.

The Appeals Committee will review the findings and recommendations of either the Grievance Examiner if a hearing was waived or of the Board of Inquiry if a hearing was held. The Appeals Committee will determine if the record on the complaint supports a finding of conduct contrary to or in violation of reasonable practices. If two-thirds of the Appeals Committee so find, the Committee will recommend to the President of ASE appropriate sanctions or courses of action against the parties charged.

PROCEDURES FOR CERTIFICATION/RECERTIFICATION

Process Overview

NOTE: NATEF recommends that programs maintain a file containing copies of all reference and documentation materials developed during all phases of the certification process.

1. Purchase application materials

The program requesting certification must purchase self-evaluation materials from NATEF in Herndon, VA. To begin the certification process, the program must return four items from the evaluation materials packet. These four items are:

a. Application for Certification or Recertification
b. Self Evaluation Summary Sheet
c. On-site Evaluation Team Member List
d. Instructor Qualification Sheet

2. NATEF review of application

The national office will review the materials within 30 days. Following the review, the program administrator and the state Trade & Industrial Supervisor will be notified about the status of the program. The program will be identified as one of the following:

a. qualified for on-site evaluation for all the specialty areas listed on the application.
b. qualified for on-site evaluation for some but not all specialty areas listed on the application. The program administrator may proceed with the on-site evaluation for the specialty areas that qualify at that time OR make improvements and resubmit the application at a later date.
c. not qualified for an on-site evaluation at that time. NATEF will indicate specific improvements that must be made before the on-site evaluation can be scheduled.

3. Evaluation Team Leader (ETL) assigned, program coordinator makes contacts

In cooperation with state officials, NATEF will assign an Evaluation Team Leader (ETL) to a program. NATEF will also send the program the Application for On-site Evaluation. With a legitimate reason, the program coordinator can contact the NATEF office to request a different ETL. (The ETL assigned must NOT be a present or former teacher or administrator of the program to be evaluated.) The program coordinator must contact the ETL to arrange a date for the on-site evaluation.

The Application for the On-site Evaluation will be sent with instructions that outline the plans for the local administration and the costs for the ETL's services and expenses. These costs will be paid by the institution requesting certification.

4. Send on-site application, check, course of study, and list of on-site evaluation team members to ETL

The Application for On-site Evaluation must be sent to the ETL, signed by the program administrator, and accompanied by a check to cover the costs of materials for the on-site evaluation team members. A copy of the course of study and this application must be received by the ETL at least two weeks prior to the on-site evaluation or the on-site must be rescheduled . The course of study should include the following items:

a. syllabus for each class
b. tasks to be taught under each area, specified according to High Priority designations (HP-I, HP-G)
c. number of contact hours for each area (Tasks may be taught at different times in the program or in more than one area. However, the hours for the tasks may be counted only once.)
d. areas and sequence of instruction to be included in the program
e. list of training materials and audio-visual materials used in training
f. sample evaluation form used to track student progress

Include the On-site Evaluation Team Member List for the ETL to review and approve. Once a date has been set and the on-site evaluation team members have been approved by the ETL, the program coordinator must contact the on-site evaluation team members to make arrangements for the evaluation day(s).

5. On-site evaluation

Initial certification requires 2 consecutive days for the on-site evaluation review of all the Standards. However, if more than one program is applying for certification (general autobody and GM BSEP, for example), additional team members and additional days may be required to complete the on-site evaluation. The need for additional team members and/or days will be determined by the NATEF office.

Recertification requires a 1-day on-site evaluation and Standards 6-9 are reviewed by the on-site evaluation team. However, if the Advisory Committee average on Standards 1-5 or Standard 10 was less than 4, these Standards must be reviewed by the on-site evaluation team. The NATEF office will determine whether an additional day or additional team members will be required to complete the on-site evaluation.

6. ETL reports results to NATEF

The ETL will submit all on-site evaluation materials and a final report to NATEF with a recommendation for or against program certification.

7. Program certification

The national office will review the final report and all additional evaluation materials to determine whether the program meets the requirements for certification and will make their recommendation to the ASE Board. The ASE President, however, will approve certification as sanctioned by the Board of Trustees.

Programs that do not earn certification will be given a written report specifying improvements that must be made to qualify for certification. The decision at the national level will be final unless appealed to the ASE Board of Trustees. Appeals will be heard only at regular meetings of the Board.

The program administrator and the state Trade & Industrial Supervisor will be notified of all decisions regarding the certification status of all programs applying for ASE certification.

8. Display and reporting of certification materials

A wall plaque identifying the certified areas will be forwarded from the national office to the program administrator. Schools must accurately report areas of ASE certification.

9. Certified Autobody Technician Training List

The NATEF office maintains a current listing of all ASE certified programs. The list is made available upon request.

10. Compliance report

A program will be certified for five years. A compliance report is required after 2½ years. The compliance report will be used to verify that a program is maintaining its standards. NATEF will notify the program administrator of the compliance date and will send the appropriate certification review forms at that time. The program administrator must complete the forms and return them to the NATEF office.

11. Recertification

The NATEF office will contact the program coordinator six (6) months prior to the certification expiration date. The program must formally request recertification materials and follow the process outlined above.

On-site Evaluation Cost Sheet
Effective April 1, 1995

COLLISION REPAIR & REFINISH

	CERTIFICATION	RECERTIFICATION
Certification Manuals (Applied Academics general statements and workplace skills list are included)	$60.00	$50.00
On-site Evaluation Team Manuals (minimum of 3 sets @ $40 each)	120.00	120.00
Honorarium for Evaluation Team Leader (ETL) @ $175/day	350.00	175.00
Estimated mileage, hotel and meal expenses for the ETL	150.00	100.00
ESTIMATED TOTAL COSTS	$680.00	$445.00

NOTE: It is anticipated that team members recruited from local independent repair facilities and dealerships will serve without charge to the institution.

COLLISION REPAIR & REFINISH PROGRAM STANDARDS

STANDARD 1 - PURPOSE

THE AUTOBODY TECHNICIAN TRAINING PROGRAM SHOULD HAVE CLEARLY STATED PROGRAM GOALS, RELATED TO THE NEEDS OF THE STUDENTS AND EMPLOYERS SERVED.

Standard 1.1 - Employment Potential

The employment potential for autobody technicians, trained to the level for the specialty or general areas outlined in the program goals, should exist in the geographic area served by the program.

Standard 1.2 - Program Description/Goals

The written description/goals of the program should be shared with potential students and should include admission requirements, employment potential, area(s) of specialty training offered, and the cost of all tuition and fees. Technical qualifications of the faculty and the overall goal(s) of the program should also be included.

STANDARD 2 - ADMINISTRATION

PROGRAM ADMINISTRATION SHOULD ENSURE THAT INSTRUCTIONAL ACTIVITIES SUPPORT AND PROMOTE THE GOALS OF THE PROGRAM.

Standard 2.1 - Student Competency Certification

The certificate or diploma a student received upon program completion should clearly specify the area(s) of demonstrated competency.

Standard 2.2 - Chain of Command

An organizational chart should be used to indicate the responsibilities for instruction, administration, and support services.

Standard 2.3 - Administrative Support

Positive administrative support from institutional and local governing bodies should be demonstrated. Indicators of administrative support would include: support for staff in-service training; provision of appropriate facilities; up-to-date tools, equipment, and training support materials.

Standard 2.4 - Written Policies

Written policies should be adopted by the administration and policy board for use in decision-making situations and to provide guidance in achieving the program goals. Policies regarding

safety, liability, and lab/shop operation should be written and prominently displayed as well as provided to all students and instructors.

Standard 2.5 - Advisory Committee

An Advisory Committee must convene at least two times a year and be utilized to provide counsel, assistance, and information from the community served by the training program. This Committee should be broadly based and include former students, employed technicians, employers, and representatives for consumer's interests.

Standard 2.6 - Public/Community Relations

An organized plan should be used to provide the community at large information regarding the training program, its graduates, its plans, and any services provided to the community.

Standard 2.7 - Live Work

A systematic method of collecting, documenting, and disbursing live work repair receipts should be used. Instructional staff should not be required to collect payment for live work repairs.

STANDARD 3 - LEARNING RESOURCES

SUPPORT MATERIAL, CONSISTENT WITH BOTH PROGRAM GOALS AND PERFORMANCE OBJECTIVES, SHOULD BE AVAILABLE TO STAFF AND STUDENTS.

Standard 3.1 - Service Information

Service information with current manufacturers' service procedures and specification data for vehicles manufactured within the last ten (10) years should be available. This information should be accessible to students while working in the lab/shop area.

Standard 3.2 - Multimedia

Appropriate up-to-date multimedia materials such as video equipment, transparencies, etc. should be readily available and utilized in the training process.

Standard 3.3 - Instructional Development Services

The service of professional instructional development personnel should be used when available. At a minimum, equipment and supplies should be available for duplication or copying printed materials and transparencies. Instructional development personnel should conduct in-service and/or training in curriculum and media development.

Standard 3.4 - Periodicals

Current general and technical autobody magazines and newspapers should be available for student and instructor use.

Standard 3.5 - Student Materials

Necessary instructional texts or pertinent material should be available for each student to satisfy the objectives of the mode of instruction used. Basic textbooks should have copyright dates that are not over six (6) years old; specialized textbooks should have copyright dates that are not over three (3) years old.

STANDARD 4 - FINANCES

FUNDING SHOULD BE PROVIDED TO MEET THE PROGRAM GOALS AND PERFORMANCE OBJECTIVES.

Standard 4.1 - Program Enrollment

The enrollment in the program or program area should be sufficient to keep the per-student training costs to a realistic figure.

Standard 4.2 - Budget

An adequate annual budget should be developed, allocated, and used for the operation of the program.

Standard 4.3 - Budget Preparation

The budget should be prepared by the institutional administration in conjunction with the program faculty.

Standard 4.4 - Status Reports

Budget status reports should be made available to program staff, at least quarterly.

STANDARD 5 - STUDENT SERVICES

SYSTEMATIC PRE-ADMISSION TESTING, INTERVIEWS, COUNSELING SERVICES, PLACEMENT, AND FOLLOW-UP PROCEDURES SHOULD BE USED.

Standard 5.1 - Pretesting

A formal pretesting program should be used to assess a student's abilities in reading, mathematics, and mechanical aptitude to evaluate and assure the student a reasonable probability of success as an autobody technician. Testing procedures should be stated in program explanatory material and justification for all requirements should be available.

Standard 5.2 - Pre-admission Interviews

Prior to program admission, a student should be interviewed and approved for admission.

Standard 5.3 - Student Records
Permanent records of former students should be available, preferably in one central location, and kept confidential.

Standard 5.4 - Placement
A systematic student placement system should be used to assist program graduates to obtain employment in the autobody industry.

Standard 5.5 - Follow-up
A follow-up system should be used to determine students' employment location and for feedback regarding the efficiency, effectiveness, and appropriateness of training. The follow-up procedure should be designed to assure feedback regarding needed additions or deletions to the training curriculum, program, and tools and equipment. Follow-up of graduates employed outside of the autobody industry should indicate reasons for non-autobody employment. When applicable, this information should be used to modify the training quality and/or content.

Standard 5.6 - Legal Requirements
The training program should meet all applicable local, state, and federal requirements.

STANDARD 6 - INSTRUCTION

INSTRUCTION MUST BE SYSTEMATIC AND REFLECT PROGRAM GOALS. A TASK LIST AND SPECIFIC PERFORMANCE OBJECTIVES WITH CRITERION REFERENCED MEASURES MUST BE USED.

Standard 6.1 - Program Plan
The training plan should progress in logical steps, provide for alternate sequences, where applicable, and be made available to each student.

Standard 6.2 - Student Training Plan
A training plan for each student should be used, indicating the student's training goal(s) and specific steps needed to meet that goal. Students should be given a copy of their training plan.

Standard 6.3 - Preparation Time
Adequate time should be provided for teacher preparation and program development.

Standard 6.4 - Teaching Load
The instructor/student ratio and class contact hours should allow time for interaction on a one-to-one basis.

Standard 6.5 - Curriculum

High Priority items on the task list are broken down into two categories: High Priority-Individual (HP-I) and High Priority-Group (HP-G). At least 95% of the High Priority - Individual (HP-I) and 90% of the High Priority - Group (HP_G) items in the Task List must be included in the curriculum. Additional tasks may be included to meet the needs of local employers. All additional tasks should be approved by the Advisory Committee.

Instruction on the legal aspects and responsibilities of the autobody technician in areas such as Environmental Protection Agency regulations, safety regulations, OSHA regulations, and other appropriate requirements should be included in the curriculum. Instruction and practice in filling out work order forms, ordering parts, and basic record keeping should be a part of the training program.

Tools and equipment must be available to perform the tasks in each of the areas in which certification is requested.

Standard 6.6 - Student Progress

A record of each student's progress should be maintained through the use of a progress chart or other recording device. The record should indicate tasks required for mastery in the area and those tasks the student has mastered.

Standard 6.7 - Performance Standards

All instruction should be performance based, with an acceptable performance standard stated for each task. These standards should be shared with students and potential employers. Students should demonstrate "hands-on competency" or "mastery" of a task before the instructor verifies a student's performance.

Standard 6.8 - Safety Standards

Safety instruction should be given prior to lab/shop work and be an integral part of the training program. A safety test should be included in the training program. Students and instructors should comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment while in the lab/shop area.

Standard 6.9 - Personal Characteristics

All training activities and instructional material should emphasize the importance of maintaining high personal standards.

Standard 6.10 - Work Habits/Ethics

The training program should be organized in such a manner that work habits and ethical practices required on the job are an integral part of the instruction.

Standard 6.11 - Provision for Individual Differences

The training program should be structured in such a manner that students with different levels of cognitive and psychomotor skills can be accommodated.

Standard 6.12 - Instruction

Instruction in related mathematics, communication, and interpersonal relations should be provided and coordinated with ongoing instruction in the training program. This instruction should be provided by a qualified instructor.

Standard 6.13 - Testing

Both written and performance based tests should be used to validate student competency. Students should be encouraged to take certification tests that are publicly recognized indicators of capabilities.

Standard 6.14 - Evaluation of Instruction

Instructional procedures should be evaluated in a systematic manner. This evaluation should be through regular reviews by students and the administration. Self-evaluation of instruction should also be utilized on a systematic and regular basis. This system should include input from former students and the Advisory Committee members. Instructional procedures should show a responsiveness to the feedback from these evaluations.

Standard 6.15 - Live Work

Live work should be scheduled to benefit the student and supplement ongoing instruction on items specified in the NATEF task list. A student should have had instruction and practice on a specific repair task before live work requiring that task is assigned. Donated vehicles by the manufacturers or other sources, customer-owned vehicles, and other training vehicles may be used as the primary source of live work. Vehicles owned by students in the autobody training program and school buses or other vehicles owned or operated by the governing body of the school should not be the primary source of live work vehicles. All vehicles in the lab/shop should have a completed industry-type work order attached to or on the vehicle.

Standard 6.16 - Articulation

Agreements between programs with equivalent competencies should be used to eliminate unnecessary duplication of instruction.

STANDARD 7 - EQUIPMENT

EQUIPMENT AND TOOLS USED IN THE AUTOBODY TECHNICIAN TRAINING PROGRAM MUST BE OF THE TYPE AND QUALITY FOUND IN THE REPAIR INDUSTRY AND MUST ALSO BE THE TYPE NEEDED TO PROVIDE TRAINING TO MEET THE PROGRAM GOALS AND PERFORMANCE OBJECTIVES.

Standard 7.1 - Safety

Equipment and tools used in the training program must have all shields, guards, and other safety devices in place, operable, and used.

Standard 7.2 - Quantity and Quality

The tools and equipment used in the training program should reflect the program goals and performance objectives. Sufficient tools and equipment should be available for the training offered. The tools and equipment should meet industry quality standards.

Standard 7.3 - Consumable Supplies

Sufficient consumable supplies should be readily available to assure continuous instruction.

Standard 7.4 - Maintenance

A preventive maintenance schedule should be used to minimize equipment down-time.

Standard 7.5 - Replacement

A systematic schedule for replacement should be used to maintain up-to-date tools and equipment at industry and safety standards. Student follow-up and Advisory Committee input should be used in this system.

Standard 7.6 - Inventory

An inventory system should be used to account for tools, equipment, parts, and supplies.

Standard 7.7 - Parts Purchasing

A systematic parts purchasing system, from work order to parts specialist to jobber, should be used. Task performance should not be unreasonably delayed due to lack of replacement parts.

Standard 7.8 - Hand Tools

Each student should have a basic hand tool set comparable to tools required for employment. The students should be encouraged to purchase a hand tool set during the period of instruction, appropriate to the autobody specialty area(s) in which they are receiving training.

STANDARD 8 - FACILITIES

THE PHYSICAL FACILITIES MUST BE ADEQUATE TO PERMIT ACHIEVEMENT OF THE PROGRAM GOALS AND PERFORMANCE OBJECTIVES.

Standard 8.1 - Training Stations

Training stations (bench and live work) should be available in the type and number required for the performance of tasks outlined in the program goals and performance objectives.

Standard 8.2 - Safety

The facilities should meet all applicable safety standards.

Standard 8.3 - Maintenance
A regular facilities maintenance program should be used to assure facilities are suitable when required for instruction.

Standard 8.4 - Housekeeping
The classroom(s), lab/shop, and support area(s) should be kept clean and orderly.

Standard 8.5 - Office Space
An area separate from the shop should be available and convenient for the instructor(s) use as an office.

Standard 8.6 - Instructional Area
A classroom convenient to, but separate from, the lab/shop area must be available for instruction and other non-lab/shop activities.

Standard 8.7 - Storage
Storage areas for tools, parts, supplies, and automobiles should be sufficient to support the activities outlined in the program goals and performance objectives. Security should be provided to prevent pilferage and vandalism.

Standard 8.8 - Support Facilities
Restrooms, clean-up areas, and lockers should be provided for both male and female students and be convenient to the instructional area.

Standard 8.9 - Ventilation
An adequate exhaust fume removal system should be in place and operational. When appropriate, heating and cooling systems should be used to provide sufficient comfort for learning.

Standard 8.10 - First Aid
A first aid kit should be in place and comply with local regulations.

Standard 8.11 - Facility Evaluation
The Advisory Committee should conduct an annual evaluation of the facilities to assure adequacy to meet program goals.

STANDARD 9 - INSTRUCTIONAL STAFF

THE INSTITUTIONAL STAFF MUST HAVE TECHNICAL COMPETENCY AND MEET ALL STATE AND LOCAL REQUIREMENTS FOR CERTIFICATION.

Standard 9.1 - Technical Competency
The instructor must hold current ASE certification in the specialty area considered for certification.

Standard 9.2 - Instructional competency/certification
Instructors should meet all state certifying requirements.

Standard 9.3 - Technical Updating
Faculty members should be provided technical materials required to maintain their competency. An opportunity should be provided for instructors to return to industry on a regular basis for in-service and skill upgrading.

Standard 9.4 - First Aid
The program should have a written policy, approved by the administrator of the school, on First Aid procedures.

Standard 9.5 - Substitutes
A systematic method of obtaining "substitute" instructors should be used to assure instructional continuity. An orientation session for substitutes should be held on a regular basis. The substitute should be a competent autobody instructor.

STANDARD 10 - COOPERATIVE AGREEMENTS

WRITTEN POLICIES AND PROCEDURES SHOULD BE USED FOR COOPERATIVE AND APPRENTICESHIP TRAINING PROGRAMS.

Standard 10.1 - Standards
Student performance standards should be developed and coordinated by the supervising instructor.

Standard 10.2 - Agreements
All agreements should be written and legally binding.

Standard 10.3 - Supervision
A supervising autobody instructor should be assigned responsibility, authority, and time to coordinate and monitor cooperative/apprenticeship autobody programs.

TASK LIST
TASK LIST INFORMATION

The NATEF task list was reviewed and updated in 1993 with funding from a grant awarded by the U.S. Department of Education. In February 1993, a national committee was assembled in Herndon, Virginia to review the standards used in the Autobody certification program. The committee consisted of individuals representing the major automobile manufacturers, autobody repair shop owners and technicians, autobody instructors, autobody equipment and parts suppliers, Inter-Industry Conference on Auto Collision Repair (I-CAR), and state Technical and Industrial education supervisors. The committee reviewed the Standards, task list, tools and equipment list, program hours, and instructor qualifications. The committee also had, for their reference, the most current (September, 1992) National Institute for Automotive Service Excellence (ASE) task list. The ASE task list was developed with the expertise of a similar panel of technical service experts. The ASE task list is used to develop the ASE certification examination, a nationally recognized symbol of competence in diagnosing and repairing vehicle problems.

The NATEF Autobody committee recommended that the "High Priority" tasks have an additional designation based on demonstration of competency. **High Priority - Group (HP-G) is defined as a task that can be taught in a group setting (2 or more students) through the use of video, demonstration, etc. Students should be tested on the information presented, but are not required to demonstrate competency on an individual basis. High Priority - Individual (HP-I) is defined as a task that requires students to demonstrate competency to the instructor on an individual basis.**

Certified programs must include 95% of the HP-I tasks and 90% of the HP-G tasks in the curriculum. Tasks not designated as HP-I and HP-G are additional tasks that may be included in the curriculum. Competency in HP-I tasks will indicate to employers that the graduate is skilled in that area. HP-G tasks will indicate to employers that the graduate has been tested on the information, but may not have "hands-on" competency skills.

Assumptions

1. In all areas appropriate theory, safety, and support instruction will be required for performing each task. It is assumed that this has included identification and use of appropriate tools and testing and measuring equipment required to accomplish certain tasks. It is also assumed that the student has received the necessary training to locate and use current reference and training materials from accepted industry publications (in most cases published by the vehicle manufacturers). These publications present manufacturers' recommended or required specifications and procedures for performing various tasks.

2. The individual training program being evaluated for certification should have written and detailed performance standards for each task taught in the curriculum. The learning progress of students should be monitored and evaluated against these performance standards. A system should be in place which informs all students of their individual progress through all phases of the training program.

3. It is recognized that individual courses of study will differ across autobody technician training programs. The development of appropriate learning delivery systems and tests which monitor student progress will be the responsibility of the individual training program.

4. NATEF standards require that 95% of the HP-I tasks and 90% of the HP-G tasks be included in the instructional program and curriculum to satisfy certification standards. For additional information, review the section entitled, "Task List Information".

NATEF TASK LIST

I. STRUCTURAL ANALYSIS AND DAMAGE REPAIR

A. Frame Inspection and Repair

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment.	HP-I
2. Diagnose and measure structural damage using tram, centering, and datum guages according to industry specifications.	HP-I
3. Attach frame anchoring devices.	HP-G
4. Straighten and align mash (collapse) damage.	HP-G
5. Straighten and align sag damage.	HP-G
6. Straighten and align sidesway damage.	HP-G
7. Straighten and align twist damage.	
8. Straighten and align diamond frame damage.	
9. Remove and replace damaged frame horns, side rails, cross members, and front or rear sections.	
10. Restore corrosion protection to repaired or replaced frame areas.	HP-G
11. Repair or replace weakened or cracked frame members in accordance with vehicle manufacturers' recommendations/industry standards.	HP-G
12. Identify misaligned or damaged steering, suspension, and power train components which can cause vibration, steering, and wheel alignment problems; align or replace in accordance with vehicle manufacturers' recommendations.	

I. STRUCTURAL ANALYSIS AND DAMAGE REPAIR

B. Unibody Inspection, Measurement, and Repair

NOTE: Recognize that measuring, dimensioning, and tolerance limits in unibody vehicles are critical to repair of these

vehicles; recognize that suspension/steering mounting points and engine power train attaching points are critical to vehicle handling, performance, and safety.

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment.	HP-I
2. Identify misaligned or damaged steering, suspension, and power train components which can cause vibration, steering, and 4-wheel alignment problems; realign or replace in accordance with vehicle manufacturers' recommendations.	HP-G
3. Diagnose and analyze unibody vehicle center line misalignment using centering guages.	HP-I
4. Diagnose and analyze unibody vehicle length and width using a tram guage.	HP-I
5. Diagnose and analyze unibody vehicle height using datum line guages.	HP-I
6. Determine the locations of all suspension, steering, and power train component attaching points on the body.	HP-G
7. Diagnose and measure unibody vehicles using a dedicated (fixture) measuring system.	
8. Diagnose and measure unibody vehicles using a universal measuring system (mechanical, electronic, laser).	HP-G
9. Determine the extent of the direct and indirect damage and the direction of impact; plan the methods and sequence of repair.	HP-I
10. Attach body anchoring devices.	HP-G
11. Straighten and align cowl assembly.	
12. Straighten and align roof rails (headers) and roof panels.	
13. Straighten and align hinge and lock pillars.	HP-G
14. Straighten and align body openings, floor pans, and rocker panels.	HP-G

15. Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails, suspension, and power train mounting points).

16. Straighten and align front end sections (aprons, strut towers, upper and lower rails, steering, suspension, and power train mounting points, etc.). HP-G

17. Use proper heat stress relief methods in high strength steel. HP-G

18. Use proper cold stress relief methods. HP-G

19. Remove folds, curves, creases, and dents using power tools and hand tools to restore damaged areas to proper contours and dimensions. HP-I

20. Determine the extent of damage to structural steel body panels, repair or replace. HP-I

21. Remove and replace damaged sections of structural steel body panels in accordance with manufacturers' specifications. HP-G

22. Restore corrosion protection to repaired or replaced unibody structural areas. HP-I

I. STRUCTURAL ANALYSIS AND DAMAGE REPAIR

C. Fixed Glass

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Remove and replace fixed glass (heated and non-heated) using manufacturers' recommendations. HP-G

3. Remove and replace modular glass using manufacturers' recommendations. HP-G

I. STRUCTURAL ANALYSIS AND DAMAGE REPAIR

D. Metal Welding and Cutting

1. Comply with personal and environmental safety practices associated with clothing, eye HP-I

protection, use of chemicals, hand tools, and power equipment.

2. Identify weldable and non-weldable materials used in autobody components; understand the limitations of welding and cutting high-strength steels and other metals. HP-I

3. Determine correct welder type (MIG, resistance spot, oxy-acetylene, TIG), electrode, wire type, diameter, and gas to be used in specific welding situations. HP-I

4. Set up welding equipment. HP-I

5. Adjust the welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the material being welded. HP-I

6. Apply knowledge of the procedures for safely handling high-pressure gas cylinders. HP-G

7. Determine work clamp (ground) location and attach. HP-I

8. Use the proper angle of the gun to the joint and the direction of the gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions. HP-I

9. Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations. HP-G

10. Protect computers and other electronic control modules from possible weld damage. HP-G

11. Clean the metal to be welded; assure good metal fit-up through preparation and clamping; apply weld-through primer. HP-I

12. Determine the joint type (butt, lap, etc.) for weld being made. HP-I

13. Determine the type of weld (continuous, stitch/pulse, tack, plug, etc.) for each specific welding operation. HP-I

14. Perform continuous, stitch/pulse, tack, plug, spot weld (on butt and lap joints); perform destructive tests. HP-I

15. Identify the causes of spits and sputters, burn through, lack of penetration, cracks in metal, porosity, incomplete fusion, excessive spatter, distortion, and waviness of bead; make necessary adjustments. HP-I

16. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. HP-I

17. Identify cutting process for different materials and locations in accordance with manufacturers' recommendations; perform cutting operation. HP-I

II. NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR

A. Preparation

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Review damage report and analyze damage to determine appropriate methods for overall repair; develop repair plan. HP-G

3. Remove and replace exterior trim and moldings. HP-I

4. Remove and replace interior trim and components. HP-I

5. Remove and replace non-structural body panels and components that may interfere with or be damaged during repair. HP-I

6. Remove and replace all vehicle mechanical and electrical components that may interfere with or be damaged during repair. HP-G

7. Protect panels and parts adjacent to repair area. HP-I

8. Remove dirt, grease, and wax from those areas to be repaired. HP-I

9. Remove corrosion protection, undercoatings, sealers, and other protective coatings necessary to perform repairs. HP-I

10. Remove and replace repairable plastics and other components that are recommended for off-vehicle repair.

11. Apply safety and environmental practices associated with vehicle components and systems, i.e. ABS, air bags, refrigerants, etc. HP-G

II. NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR

B. Outer Body Panel Repairs, Replacements, and Adjustments

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Determine the extent of direct and indirect damage and direction of impact; develop repair plan. HP-G

3. Remove and replace bolted, bonded, and welded steel panel or panel assemblies. HP-I

4. Determine the extent of damage to aluminum body panels; repair, weld or replace in accordance with manufacturers' specifications.

5. Remove, replace, and align hood, hood hinges, and hood latch. HP-I

6. Remove, replace, and align deck lid, lid hinges, and lid latch. HP-I

7. Remove, replace, and align doors, tailgates, hatches, lift gates, latches, hinges, and related hardware. HP-I

8. Remove, replace, and align bumper bars, covers, reinforcement guards, isolators, and mounting hardware. HP-I

9. Check and align front fenders, headers, and other panels. HP-I

10. Straighten and rough-out contours of damaged panel to a surface condition for body filling or metal finishing using power tools, hand tools, and stud welder. HP-I

11. Weld cracked or torn steel body panels; repair broken welds. HP-I

12. Restore corrosion protection. HP-I

13. Braze body panels only in locations recommended by vehicle manufacturers.

14. Cut out damaged sections of sheet steel body panels and weld in replacements according to vehicle and industry specifications. HP-I

15. Replace door skins. HP-I

16. Replace intrusion beams in accordance with vehicle manufacturers' specifications. HP-G

17. Replace or repair rigid, semi-rigid, and flexible plastic panels according to vehicle and industry specifications.

18. Restore sealers, mastic, sound deadeners, and foam fillers. HP-I

19. Diagnose and repair water leaks, dust leaks, and wind noise. HP-G

II. NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR

C. Metal Finishing and Body Filling

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Remove paint from the damaged area of a body panel. HP-I

3. Pick, file, and disc sand the damaged area of a body panel to locate and reduce surface irregularities. HP-I

4. Demonstrate hammer and dolly techniques. HP-I

5. Heat shrink stretched panel areas to proper contour.

6. Cold shrink stretched panel areas to proper contour.

7. Mix body filler. HP-I

8. Apply body filler; cheese-grate during curing. HP-I

9. Rough sand cured body filler to contour; finish sand. HP-I

II. NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR

D. Moveable Glass and Hardware

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls. HP-I

3. Repair or replace power-driven accessories and related controls (including electrically-heated glass).

4. Diagnose and repair water leaks, dust leaks, and wind noises; inspect, repair, and replace weatherstripping. HP-G

5. Inspect, repair or replace, and adjust removable, manually or power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sun roofs.

6. Remove, reinstall, and align convertible top and related mechanisms.

II. NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR

E. Metal Welding and Cutting

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Identify weldable and non-weldable materials used in autobody components; understand the limitations of welding and cutting high-strength steels and other metals. HP-I

3. Determine correct welder type (MIG, resistance spot, oxy-acetylene, TIG), electrode, wire type, diameter, and gas to be used in specific welding situations. HP-I

4. Set up welding equipment. HP-I

5. Adjust the welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the material being welded.	HP-I
6. Apply knowledge of the procedures for safely handling high-pressure gas cylinders.	HP-G
7. Determine work clamp (ground) location and attach.	HP-I
8. Use the proper angle of the gun to the joint and the direction of the gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.	HP-I
9. Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations.	HP-G
10. Protect computers and other electronic control modules from possible weld damage.	HP-G
11. Clean the metal to be welded; assure good metal fit-up through preparation and clamping; apply weld-through primer.	HP-I
12. Determine the joint type (butt, lap, etc.) for weld being made.	HP-I
13. Determine the type of weld (continuous, stitch/ pulse, tack, plug, etc.) for each specific welding operation.	HP-I
14. Perform continuous, stitch/pulse, tack, plug, spot weld (on butt and lap joints); perform destructive tests.	HP-I
15. Identify the causes of spits and sputters, burn through, lack of penetration, cracks in metal, porosity, incomplete fusion, excessive spatter, distortion, and waviness of bead; make necessary adjustments.	HP-I
16. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.	HP-I
17. Identify cutting process for different materials and locations in accordance with manufacturers' recommendations; perform cutting operation.	HP-I

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III. MECHANICAL AND ELECTRICAL COMPONENTS

A. Suspension and Steering

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment.	HP-I
2. Identify suspension system fasteners which should not be reused.	HP-G
3. Inspect and replace rack and pinion steering gear, inner tie rod ends, and bellows boots.	HP-G
4. Inspect alignment, adjust tension, and replace power steering pump belts.	HP-G
5. Remove and replace power steering pump; inspect pump mounts.	HP-G
6. Inspect and replace power steering hoses and fittings.	HP-G
7. Remove and replace power steering gear (non-rack and pinion type).	HP-G
8. Remove and replace power rack and pinion steering gear; inspect and replace mounting bushings and brackets; ensure proper mounting location.	HP-G
9. Inspect and adjust (where applicable) steering linkage geometry (attitude/parallelism).	HP-G
10. Inspect and replace pitman arm.	HP-G
11. Inspect and replace relay (center link/ intermediate) rod.	HP-G
12. Remove and replace idler arm and mountings.	HP-G
13. Remove and replace tie rod sleeves, clamps, and tie rod ends.	HP-G
14. Remove and replace steering linkage damper.	HP-G
15. Remove and replace upper and lower control arms.	HP-G
16. Remove and replace upper and lower control arm bushings, shafts and rebound bumpers.	HP-G
17. Remove and replace upper and lower ball joints.	HP-G

18. Remove and replace steering knuckle/spindle/hub assemblies.	HP-G
19. Remove and replace front suspension system coil springs and spring insulators (silencers).	HP-G
20. Inspect, replace, adjust front suspension system torsion bars, and inspect mounts.	HP-G
21. Inspect and replace stabilizer bar bushings, brackets, and links.	HP-G
22. Inspect and replace MacPherson strut cartridge or assembly, upper bearing, and mount.	HP-G
23. Remove and replace rear suspension system coil springs and spring insulators (silencers).	HP-G
24. Inspect, remove, and replace rear suspension system transverse links, control arms, stabilizer bars, bushings, and mounts.	HP-G
25. Inspect, remove, and replace rear suspension system leaf spring(s), leaf spring insulators (silencers), shackles, brackets, bushings, and mounts.	HP-G
26. Inspect rear axle assembly for damage and misalignment.	HP-G
27. Inspect and replace shock absorbers.	HP-G
28. Inspect and replace air shock absorbers, load-leveling devices, air springs, and associated lines and fittings.	HP-G
29. Diagnose, inspect, adjust, repair or replace components of electronically-controlled suspension systems.	HP-G
30. Measure vehicle ride height; determine needed repairs.	HP-I
31. Remove, replace, and align front and rear frame (cradles/stub).	HP-G
32. Diagnose steering column damage, looseness, and binding problems (including tilt mechanisms); determine needed repairs.	HP-G

33. Diagnose manual steering gear (non-rack and pinion type) noises, binding, uneven turning effort, looseness, hard steering, and lubricant leakage problems; determine needed repairs. HP-G

34. Diagnose manual rack and pinion steering gear noises, vibration, looseness, and hard steering problems; ensure proper mounting location. HP-G

35. Inspect and replace steering shaft U-joint(s), flexible coupling(s), collapsible columns, and steering wheels. HP-I

36. Diagnose power steering gear (non-rack and pinion type) noises, binding, uneven turning effort, looseness, hard steering, and fluid leakage problems; determine needed repairs. HP-G

37. Diagnose power rack and pinion steering gear noises, vibration, looseness, hard steering, and fluid leakage problems; determine needed repairs. HP-G

38. Diagnose non-MacPherson front and rear suspension system noises and body sway problems; determine needed repairs. HP-G

39. Diagnose MacPherson strut suspension system noises and body sway problems; determine needed repairs. HP-G

40. Diagnose vehicle wandering, pulling, hard steering, bump steering, memory steering, torque steering, and steering return problems; determine needed repairs. HP-G

41. Check and adjust front and rear wheel camber on suspension systems with camber adjustments. HP-I

42. Check front and rear wheel camber on non-adjustable suspension system; determine needed repairs. HP-I

43. Check and adjust caster on suspension systems with caster adjustments. HP-I

44. Check caster on non-adjustable suspension systems; determine needed repairs. HP-I

45. Check and adjust front wheel toe. HP-I

46. Center steering wheel. HP-I

47. Identify toe-out-on-turns (turning radius) related problems; determine needed repairs. HP-I

48. Identify SAI (steering axis inclination)/KPI (king pin inclination) related problems; determine needed repairs. HP-I

49. Check rear wheel toe; determine needed repairs. HP-I

50. Identify thrust angle related problems; determine needed repairs. HP-I

51. Check for front wheel setback; determine needed repairs. HP-I

52. Diagnose tire wear patterns; determine needed repairs. HP-I

53. Inspect tires, identify direction of rotation, and location; check and adjust air pressure. HP-I

54. Diagnose wheel/tire vibration, shimmy, and tramp (wheel hop) problems; determine needed repairs. HP-I

55. Measure wheel, tire, axle, and hub runout; determine needed repairs. HP-I

56. Diagnose tire pull (lead) problems; determine corrective actions. HP-I

57. Reinstall wheels and torque lug nuts. HP-I

III. MECHANICAL AND ELECTRICAL COMPONENTS

B. Electrical

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Check voltages in electrical wiring circuits with a DMM (digital multimeter). HP-I

3. Check continuity and resistance in electrical wiring circuits and components with a DMM (digital multimeter). HP-I

4. Check electrical circuits, wiring, and connectors; repair according to manufacturers' specifications. HP-I

5.	Inspect, test and replace fusible links, circuit breakers, and fuses.	HP-I
6.	Perform battery state-of-charge test; determine needed service.	HP-I
7.	Inspect, clean, and replace battery.	HP-I
8.	Perform slow/fast battery charge in accordance with manufacturers' recommendations.	HP-I
9.	Identify programmable electrical/electronic components; record data for reprogramming before disconnecting battery.	HP-G
10.	Inspect, clean, and repair or replace battery cables, connectors, and clamps.	HP-I
11.	Inspect alignment, adjust, and replace alternator driver belts, pulleys, and fans.	HP-I
12.	Remove and replace alternator.	HP-G
13.	Remove and replace headlights, parking/taillights, stoplights, flashers, turn-signals, and backup lights; check operation.	HP-I
14.	Inspect, replace, and aim headlights/bulbs.	HP-I
15.	Check operation of retractable headlight assembly.	HP-I
16.	Remove and replace motors, switches, relays, connectors, and wires of retractable headlight assembly circuits.	HP-G
17.	Inspect, test and repair or replace switches, relays, bulbs, sockets, connectors, and wires of all light circuits including four-wire taillight systems.	HP-G
18.	Remove and replace horn(s); check operation.	HP-G
19.	Check operation of windshield wiper/washer system.	HP-I
20.	Check operation of power side windows and power tail-gate window.	HP-I
21.	Remove and replace power seat, motors, linkages, cables, etc.; check operation.	HP-G
22.	Remove and replace components of electric door and hatch/trunk lock; check operation.	HP-I

23. Remove and replace components of keyless lock/ unlock devices and alarm systems; check operation. HP-G

24. Remove and replace components of electrical sunroof and convertible top; check operation.

25. Check operation of electrically heated mirrors, windshields, back lights, panels, etc.; repair as necessary. HP-G

26. Remove and replace components of power antenna circuits; check operation.

III. MECHANICAL AND ELECTRICAL COMPONENTS

C. Brakes

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports; replace brake lines (double flare and ISO types), hoses, fittings, and supports. HP-I

3. Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; remove and replace hoses; tighten loose fittings and supports. HP-I

4. Select, handle, store, and install brake fluids; dispose of per EPA regulations. HP-I

5. Bleed (manual, pressure, vacuum or surge) and/or flush hydraulic brake system in accordance with manufacturers' procedures. HP-I

6. Pressure test brake hydraulic system; determine needed repair. HP-G

7. Adjust brake shoes; remove and reinstall brake drums or drum/hub assemblies and wheel bearings. HP-I

8. Reinstall wheel and torque lug nuts. HP-I

9. Remove and reinstall caliper assembly. HP-I

10. Clean and inspect caliper mountings and slides for wear and damage.	HP-G
11. Check parking brake system operation.	HP-I
12. Identify and replace ABS wheel speed sensor components according to manufacturers' specifications.	HP-G
13. Depressurize ABS hydraulic system according to manufacturers' specifications.	HP-G

III. MECHANICAL AND ELECTRICAL COMPONENTS

D. Heating and Air Conditioning

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools and power equipment.	HP-I
2. Identify and comply with environmental concerns relating to CFCs.	HP-G
3. Maintain and verify correct operation of certified refrigerant recovery and recharging equipment.	HP-G
4. Locate and identify A/C system service parts.	HP-G
5. Identify and recover refrigerant from A/C system.	HP-G
6. Recycle refrigerant in accordance with EPA regulations.	HP-G
7. Label and store refrigerant.	HP-G
8. Test recycled refrigerant for non-condensable gases.	HP-G
9. Evacuate A/C system; check for leaks.	HP-G
10. Recharge A/C system with refrigerant (liquid or vapor); perform leak test.	HP-G
11. Identify oil type and maintain correct amount in A/C system according to manufacturers' specifications.	HP-G
12. Inspect, adjust, and replace A/C compressor drive belts; check pulley alignment.	HP-G

13. Remove and replace A/C compressor; inspect, repair or replace A/C compressor mountings. HP-G

14. Inspect, repair or replace A/C system mufflers, hoses, lines, fittings, and seals. HP-G

15. Inspect A/C condenser for air flow restrictions; clean and straighten fins. HP-G

16. Inspect, test, and replace A/C system condenser and mountings. HP-I

17. Inspect and replace receiver/drier or accumulator/drier. HP-G

18. Inspect and replace evaporator. HP-G

19. Inspect and repair evaporator housing water drain. HP-G

20. Inspect, test, repair or replace heating, ventilating, and A/C vacuum components. HP-G

21. Inspect and repair A/C component wiring. HP-G

22. Inspect, test, and repair heating, ventilating and A/C ducts, doors, hoses, and outlets. HP-G

III. MECHANICAL AND ELECTRICAL COMPONENTS

E. Cooling Systems

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Inspect and replace engine cooling and heater system hoses and belts. HP-I

3. Inspect, remove and replace radiator, pressure cap, coolant recovery system, and water pump. HP-G

4. Remove and replace thermostat, by-pass, and housing.

5. Recover, refill, and bleed system with proper coolant and check level of protection; leak test system and dispose of materials in accordance with EPA specifications. HP-I

6. Remove and replace fan (both electrical and mechanical), fan pulley, fan clutch, and fan shroud. HP-G

7. Inspect, remove, and replace auxiliary oil coolers; check oil levels. HP-G

8. Inspect, remove, and replace electric fan sensors; check operation. HP-G

III. MECHANICAL AND ELECTRICAL COMPONENTS

F. Drive Train

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Remove, replace, and adjust shift or clutch linkage as required. HP-G

3. Remove, replace, and adjust cables or linkages for throttle valve (TV), kickdown, and accelerator pedal. HP-G

4. Remove and replace electronic sensors, wires, and connectors. HP-G

5. Remove and replace powertrain assembly; inspect, replace, and align powertrain mounts. HP-G

6. Remove and replace front and/or rear drive axle assembly. HP-G

7. Measure and/or adjust half shaft position/angle. HP-G

8. Remove, inspect, and replace front-drive half shafts and axle constant velocity joints (CV). HP-G

9. Inspect, remove and replace front and rear drive shafts and universal joints. HP-G

III. MECHANICAL AND ELECTRICAL COMPONENTS

G. Fuel, Intake and Exhaust Systems

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Remove, inspect, and replace exhaust manifold, exhaust pipes, mufflers, converters, resonators, tail pipes, and heat shields. HP-G

3. Remove, inspect, and replace heat stove shroud, hot air pipe, and damper of inlet air temperature control systems. HP-G

4. Remove, inspect, and replace fuel tank, fuel tank filter, fuel cap, fuel filler hose, quarter to body seal, and inertia stitch; inspect and replace fuel lines and hoses; check fuel for contaminants. HP-G

5. Remove, inspect, and replace components of air injection systems.

6. Remove, inspect, and replace canister, filter, vent, and purge lines of fuel vapor control systems. HP-G

III. MECHANICAL AND ELECTRICAL COMPONENTS

H. Restraint Systems

1. Active Restraint Systems

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Inspect, remove, and replace seatbelt and shoulder harness assembly and components in accordance with manufacturers' recommendations. HP-I

3. Inspect restraint system mounting areas for damage; repair in accordance with manufacturers' recommendations. HP-I

4. Verify proper operation of seatbelt in accordance with manufacturers' recommendations. HP-I

2. Passive Restraint Systems

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

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2. Remove and replace seatbelt and shoulder harness assembly and components in accordance with manufacturers' recommendations. HP-G

3. Inspect restraint system mounting areas for damage; repair as necessary. HP-G

4. Verify proper operation of seatbelt in accordance with manufacturers' recommendations. HP-G

5. Remove, inspect, and replace track and drive assembly, lap retractor, torso retractor, inboard buckle-lap retractor, and knee bolster (blocker) in accordance with manufacturers' recommendations. HP-G

3. Supplemental Restraint Systems (SRS)

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Disarm SRS in accordance with manufacturers' procedures. HP-I

3. Inspect and replace sensors and wiring in accordance with manufacturers' procedures; ensure sensor orientation. HP-G

4. Inspect, replace, and dispose of deployed SRS modules in accordance with manufacturers' procedures. HP-G

5. Verify that SRS is armed and operational in accordance with manufacturers' procedures. HP-I

6. Inspect, remove, replace, and dispose of non-deployed SRS in accordance with manufacturers' procedures. HP-G

7. Use fault codes and test equipment to diagnose and repair SRS. HP-G

IV. PLASTICS AND ADHESIVES

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Identify the types of plastics to be repaired. HP-I

3.	Identify the types of plastics repair procedures; clean and prepare the surface of plastic parts in accordance with industry guidelines.	HP-I
4.	Repair plastic parts with hot-air welding.	
5.	Repair plastic parts with airless welding.	HP-G
6.	Repair plastic parts with urethane or epoxy adhesives; use reinforcements if necessary.	HP-I
7.	Repair holes and cuts in rigid and flexible plastic parts using backing materials and adhesives.	HP-I
8.	Retexture plastic parts.	
9.	Repair vinyl-clad urethane foam parts.	
10.	Remove damaged areas from rigid exterior SMC (sheet molded compound) panels; repair with partial panel.	HP-G
11.	Replace bonded SMC (sheet molded compound) body panels; straighten or align panel supports.	HP-G
12.	Prepare repaired areas for refinishing.	HP-I

V. PAINTING AND REFINISHING

A. Safety Precautions

1.	Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment.	HP-I
2.	Identify and take necessary precautions with hazardous operations and materials according to EPA, state, and local regulations.	HP-I
3.	Identify personal health and safety hazards according to OSHA guidelines and "Right to Know" Act.	HP-I
4.	Inspect spray environment for cleanliness and safety hazards.	HP-I

5. Select approved respirator; inspect to ensure proper fit and operation; inspect the condition of the respirator filters and other components (to conform with local and state regulations).	HP-I

B. Surface Preparation

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment.	HP-I
2. Remove, assess, and store trim and moldings.	HP-I
3. Remove dirt, road grime, wax or other protective coatings from the area to be refinished and adjacent vehicle surfaces; wash entire vehicle.	HP-I
4. Inspect and identify substrate, type of finish and surface condition; develop a plan for refinishing using a total products system.	HP-I
5. Remove paint finish.	HP-G
6. Dry or wet sand areas to be refinished.	HP-I
7. Featheredge broken areas to be refinished.	HP-I
8. Identify type of metal and apply suitable metal treatment or primer.	HP-I
9. Mask trim and protect other areas that will not be refinished.	HP-I
10. Mix primer, primer-surfacer or primer-sealer; spray onto surface of repaired area.	HP-I
11. Apply two-component putty to minor surface imperfections.	HP-I
12. Dry or wet sand area to which primer-surfacer and/or two-component putty have been applied.	HP-I
13. Remove dust from area to be refinished, including cracks or moldings of adjacent areas.	HP-I
14. Clean area to be refinished using a final cleaning solution.	HP-I
15. Remove, with a tack rag, any dust or lint particles from the area to be refinished.	HP-I

16. Apply suitable sealer to the area being refinished when sealing is needed or desirable. HP-I

17. Scuff sand to remove nibs or overspray from a sealer. HP-I

18. Apply stone chip-resistant coating. HP-G

19. Restore corrosion-resistant coatings, caulking, and seam sealers to repaired areas. HP-G

20. Prepare adjacent panels for blending. HP-I

V. PAINTING AND REFINISHING

C. Spray Gun and Related Equipment Operation

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Inspect, clean, and determine condition and adequacy of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment). HP-I

3. Check and adjust spray gun pressure for siphon-feed, pressure-feed, gravity-feed, HVLP (high volume, low pressure) or LVLP (low volume, low pressure) guns. HP-I

4. Adjust spray gun using fluid, air, and pattern control valves. HP-I

V. PAINTING AND REFINISHING

D. Paint Mixing, Matching, and Applying

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment. HP-I

2. Determine type and color of paint already on vehicle. HP-I

3. Shake, stir, reduce, catalyze, and strain paint according to manufacturers' recommendations. HP-I

4. Use appropriate spray technique (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for finish being applied.	HP-I
5. Apply selected product on test panel in accordance with manufacturers' recommendations; check for color match.	HP-I
6. Apply single stage topcoat for panel blending or overall refinishing.	HP-I
7. Apply basecoat/clearcoat for spot and panel blending or overall refinishing.	HP-I
8. Color sand, buff, and polish finishes where necessary.	HP-I
9. Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials and refinishing procedures.	HP-G
10. Refinish rigid, semi-rigid or flexible plastic parts.	HP-I
11. Clean, condition or refinish vinyl (e.g. upholstery, dashes, and tops).	HP-I
12. Apply multi-stage (mica, pearl, etc.) coats for spot repair, panel blending or overall refinishing.	HP-G
13. Identify and mix paint formula.	HP-G
14. Tint color using formula to achieve a blendable match.	HP-G

V. PAINTING AND REFINISHING

E. Solving Paint Application Problems

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment.	HP-I
2. Identify blistering (raising of the paint surface); determine the cause(s) and correct the condition.	HP-G
3. Identify blushing (milky or hazy formation); determine the cause(s) and correct the condition.	HP-G
4. Identify crazing in the paint surface; determine the cause(s) and correct the condition.	HP-G

5. Identify contaminants in the painted surface; determine the source(s) and correct the condition. HP-G

6. Identify a dry spray appearance in the paint surface; determine the cause(s) and correct the condition. HP-G

7. Identify the presence of fish-eyes (crater-like openings) in the finish; determine the cause(s) and correct the condition. HP-G

8. Identify lifting (surface distortion or shriveling) while the topcoat is being applied; determine the cause(s) and correct the condition. HP-G

9. Identify mottling or streaking in metallic and mica paint finishes; determine the cause(s) and correct the condition. HP-G

10. Identify orange peel; determine the cause(s) and correct the condition. HP-G

11. Identify an overspray; determine the cause(s) and correct the condition. HP-G

12. Identify solvent popping (pin-holing) in freshly painted surface; determine the cause(s) and correct the condition. HP-G

13. Identify sags and runs in paint surface; determine the cause(s) and correct the condition. HP-G

14. Identify sandscratch swelling; determine the cause(s) and correct the condition. HP-G

15. Identify shrinking and splitting while finish is drying; determine the cause(s) and correct the condition. HP-G

16. Identify color that is off-shade; determine the cause(s) and correct the condition. HP-G

17. Identify tape tracking; determine the cause(s) and correct the condition. HP-G

18. Identify loss of gloss; determine the cause(s) and correct the condition. HP-G

V. PAINTING AND REFINISHING

F. Finish Defects, Causes, and Cures

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment.	HP-I
2. Identify poor adhesion; determine the cause(s) and correct the condition.	HP-G
3. Identify paint cracking (crowsfeet or line-checking, micro-checking, etc.); determine the cause(s) and correct the condition.	HP-G
4. Identify rust spots; determine the cause(s) and correct the condition.	HP-G
5. Identify blistering in the paint surface; determine the cause(s) and correct the condition.	HP-G
6. Identify water spotting; correct the condition.	HP-G
7. Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition.	HP-G
8. Identify finish damage caused by airborne contaminants (acids, soot, and other industrial-related causes); correct the condition.	HP-G
9. Identify die-back conditions (dulling of the paint film showing haziness); correct the condition.	HP-G
10. Identify chalking (oxidation); correct the condition.	HP-G
11. Identify body filler bleed-through (staining); correct the condition.	HP-G
12. Identify solvent popping (pin-holing); correct the condition.	HP-G
13. Identify buffing-related imperfections (swirl marks, wheel burns); correct the condition.	HP-I

V. PAINTING AND REFINISHING

G. Final Detail

1. Comply with personal and environmental safety practices associated with clothing, eye protection, use of chemicals, hand tools, and power equipment.	HP-I
2. Apply decals, transfers, tapes, woodgrains, pinstripes (painted and taped), etc.	HP-G
3. Buff and polish finish as required.	HP-I
4. Clean interior, exterior, and glass.	HP-I
5. Clean body openings (door jams & edges, etc.).	HP-I
6. Remove overspray.	HP-I

Task List Priority Item Totals (by area)

I. Structural Analysis and Damage Repair

HP-I = 25
HP-G = 21
No HP = 8

II. Non-Structural Analysis and Damage Repair

HP-I = 43
HP-G = 10
No HP = 9

III. Mechanical and Electrical Components

HP-I = 60
HP-G = 93
No HP = 4

IV. Plastic Repair

HP-I = 6
HP-G = 3
No HP = 3

V. Painting and Refinishing

HP-I = 44
HP-G = 36
No HP = 0

APPLIED ACADEMICS AND WORKPLACE SKILLS

The following Applied Academic Skills general statements were developed in cooperation with the Vocational-Technical Education Consortium of States (V-TECS). The process involved using the NATEF task list and the Basic/Essential Skills Taxonomy developed at Arizona State University by Dr. Lester Snyder.

Committee meetings were held in Ft. Lauderdale, Florida and Pittsburgh, Pennsylvania. At each of the meetings, ASE Certified Collision Repair & Refinish technicians were used as experts in the automotive service industry. V-TECS used experts in three academic areas (language arts, mathematics, and science) to help the committees understand the specific definitions of the concepts used in the taxonomy.

The committees were asked to identify the academic skills required to perform each task listed in the five collision repair & refinish areas. Their responses were recorded using the Basic/Essential Skills Taxonomy codes and were put into a data base. After all the meetings were completed, a composite or unduplicated list of the codes was generated for language arts, mathematics, and science. Specific statements related to the use of the academic skill in the automotive industry were then written. A matrix was built to show the relationship between the composite list and each of the five collision repair & refinish areas. The general statements included in this manual were developed from the specific statements. Several crosschecks and reviews were conducted to ensure the accuracy of the statement and the relationship to the NATEF task list.

The Workplace Skills List was generated by having the committees identify the workplace skills from the V-TECS/ILLINOIS WORKPLACE SKILLS LIST that are important for employment as a collision repair & refinish technician.

** Please contact the NATEF office to order the Applied Academics and Workplace Skills for Collision Repair & Refinish Technicians book. This book includes the unduplicated list of applied academic skills in all areas, complete with statements of their use by collision repair & refinish technicians; the matrix; the definitions of the Basic/Essential Skills codes; the general statements; the Workplace Skills List; and the NATEF Task List.

The information in the book will provide a common vocabulary for instructors and administrators to use in achieving academic and vocational skill standards. This information can be used by programs to document the academic skills taught in collision repair & refinish technical classes. The examples for teaching an academic concept in an applied context will also be useful for schools when planning, designing, or writing curricula. **

NARRATIVE FOR LANGUAGE ARTS RELATED ACADEMIC SKILLS
for all
NATEF Collision Repair and Refinish Technician Task Lists

The collision repair and refinish technician must be proficient in the following Language Arts and Communications Related Academic Skills that are embedded in the occupation. Using these skills the technician must be able to:

- Request, collect, comprehend, evaluate, and apply oral and written information gathered from customers, associates, and supervisors regarding problem symptoms and potential solutions to problems.
- Identify the purpose for all written and oral communication and then choose the most effective strategies for listening, reading, speaking, and writing to facilitate the communication process.
- Adapt a reading strategy for all written materials, e.g. customer's notes, service manuals, shop manuals, technical bulletins, etc., relevant to problem identification, diagnosis, solution, and repair.
- Attend to verbal and nonverbal cues in discussions with customers, supervisors, and associates to verify, identify, and solve problems.
- Use study habits and techniques, i.e. previewing, scanning, skimming, taking notes, etc., when reviewing publications (shop manuals, references, databases, operator's manuals, and text resources) for problem solving, diagnosis, and repair.
- Use prior knowledge learned from solving similar problems to diagnose and repair specific problems.
- Write clear, concise, complete, and grammatically accurate sentences and paragraphs.
- Write warranty reports and work orders to include information regarding problem resolution and the results of the work performed for the customer or manufacturer.
- Comprehend and apply industry definitions and specifications to diagnose and solve problems in all systems and components of the automobile and light truck.
- Follow all oral/written directions that relate to the task or system under study.
- Comprehend and use problem-solving techniques and decision trees that are contained in service manuals and databases to determine cause-and-effect relationships.
- Scan service manuals and databases to locate specific information for problem-solving purposes.
- Use the service manual to identify the manufacturer's specifications for system parameters, operations, and potential malfunctions.

- Interpret charts, tables, or graphs to determine the manufacturer's specifications for systems operation to identify out-of-tolerance systems and subsystems.
- Supply clarifying information to customers, associates, parts suppliers, and supervisors.

NARRATIVE FOR MATHEMATICS RELATED ACADEMIC SKILLS
for all
NATEF Collision Repair and Refinish Technician Task Lists

The collision repair and refinish technician must be proficient in the following Mathematics-Related Academic Skills that are embedded in the occupation. Given these skills the technician must be able to:

- Determine the proper sequence of arithmetic operations that are needed to arrive at a solution that can be compared to other specifications when comparing system measurements or tolerances to the manufacturer's specifications.
- Add two or more whole numbers, fractions, or decimals to determine component conformance of multiple measurements with the manufacturer's specifications.
- Subtract whole numbers, fractions, or decimals to arrive at a difference for comparison with the manufacturer's specifications.
- Multiply whole numbers, fractions, or decimals to arrive at a solution for comparison with the manufacturer's specifications.
- Divide decimals to determine measurement conformance with the manufacturer's specifications.
- Convert variables presented orally to a mathematical form that allows for an algebraic solution.
- Estimate the results of basic arithmetic operations, and accurately round up or down depending on the appropriate rule for the situation.
- Analyze and solve problems requiring the use of fractions, decimals, ratios, or percentages by a direct or indirect variation of the numerical elements of the problem.
- Determine the irrelevant and/or missing data needed to solve a problem.
- Determine and interpret place value (tenths, hundredths, thousandths) when conducting precision measurements.
- Use Centigrade or Fahrenheit measurement scales to determine the existing temperature of substances such as a coolant, lubricant, compound, or finish material.
- Use English and metric volume measurement techniques to determine the volume of a system, component, or cylinder.
- Use conventional symbols (E for voltage, etc.) to solve circuit parameter calculations using formulas such as Ohm's Law, $E = IR$.
- Understand that if the described problem has certain conditions (symptoms), then a limited number of solutions to the problem apply.

- Understand the relationship between the frequency of the occurrence of a problem (symptom) and the probability of accurately predicting the problem.
- Calculate the average (mean) of several measurements to determine the variance from the manufacturer's specifications.
- Use English and metric angle and distance measurements and techniques to determine parallel lines, perpendicular lines, and angle variances from the manufacturer's specifications.
- Solve problems that involve determining the relative proportion of the desired versus undesired ingredients or elements of a mixture, and determine if that proportion is within the manufacturer's specifications.
- Comprehend and use standards defined by each manufacturer for the component or system being analyzed and repaired.
- Convert test readings that are in decimal or fraction form to a ratio or percent for comparison with the manufacturer's specifications for the sub-system under review.
- Know when to use an estimated performance value versus an exact value, basing the decision on the system being analyzed or repaired.
- Visually perceive the geometric relationship of systems and sub-systems that require alignment.
- Construct or interpret a chart, table, graph, or symbol that depicts a range of performance characteristics that can be used for comparing various system operational conditions.
- Use measurement devices to determine the parallelism or perpendicularity of chassis, suspension, and other vehicle components requiring geometric alignment.
- Use formulas to indirectly confirm that systems are outside of the manufacturer's specifications.
- Verify that the relationship between parallel lines and angles concurs with the manufacturer's specifications when diagnosing a system's malfunction.
- Formulate an angle visually and verify conformance to the manufacturer's specified angle.
- Measure timed or sequenced parameters to determine conformance with the manufacturer's specifications.
- Use English and metric scales to determine the conformance of components to the manufacturer's specified weight.
- Determine the degree of conformance to the manufacturer's specifications for length, volume, and other appropriate measurements in the English and/or metric system.

- Distinguish the congruence of the measured tolerances with those specified by the manufacturer.
- Measure and/or test with tools designed for English or metric measurements, then convert the result to the manufacturer's system used for specifying the correct measurement or tolerance.
- Compute mentally whether the observed measurement is out-of-tolerance when comparing the observed measurement to the manufacturer's specifications.
- Solve problems that involve determining whether the proportion of the existing volume or mixture compares to the manufacturer's specifications and is within the recommended tolerance.
- Distinguish whether a measurement or tolerance is equal or not equal to the manufacturer's specifications.

NARRATIVE FOR SCIENCE RELATED ACADEMIC SKILLS
for all
NATEF Collision Repair and Refinish Technician Task Lists

The collision repair and refinish technician must be proficient in the following Science-Related Academic Skills that are imbedded in the occupation. Using these skills the technician must be able to:

- Analyze and evaluate waste products from the repair task and dispose of the parts, residue, or trash according to applicable federal, state, and local rules and regulations.
- Follow all safety regulations and procedures while performing any task.
- Use the information provided in service manuals, charts, tables, graphs, or databases to determine the manufacturer's specifications for system(s) operation(s) and the appropriate repair/replacement part and/or procedure.
- Develop a hypothesis regarding the cause of the problem and test the hypothesis to determine the solution to the problem.
    1. identify the problem
    2. gather information
    3. develop hypothesis
    4. take action
    5. check results
- Convert measurements taken using the English or metric system to specifications stated in terms of either system.
- Demonstrate an understanding of the chemical reaction that occurs in various compounds and substances used in the automobile.
- Explain the role an additive or catalyst plays in the mixing of fillers or finishes for use on the automobile body.
- Describe and explain the role that pigmentation plays in determining the specific shade of an automobile body or interior component color.
- Demonstrate an understanding of the total color spectrum by explaining the roles different colors play in different mixtures and finishes.
- Explain how various forms of energy are dissipated throughout the body based on the momentum of the vehicle at the time of impact.
- Explain the principles of force as it applies to the realignment of components.
- Demonstrate an understanding of the role of balanced and unbalanced forces on linear or rotating vehicle assemblies.
- Explain how the velocity of an object in motion impacts on another object.

- Explain how the rate of a force in motion can impact on an automobile body.
- Demonstrate an understanding of the concept of pressure in relation to the concept of using force to realign a component.
- Explain the concept of heat transfer in terms of conduction, convection, and radiation in various automotive systems.
- Demonstrate an understanding of the expansion and contraction of system parts as a result of heat generated during use and the cooling down of the system when not in operation.
- Demonstrate an understanding of the effect that adding heat will cause in a state of matter, such as changing a solid to a liquid to a gas.
- Explain the role of insulation in maintaining stable temperatures or preventing the transfer of heat to an unwanted area.
- Explain the difference between heat and temperature and demonstrate an understanding of how to measure each in different situations.
- Explain how the angle or amount of light can impact on the appearance of a given finish in terms of texture and quality of finish.
- Explain color and shades of color based on how light hits or passes through it.
- Explain the difference between the principles of translucent light (diffuses) as contrasted to transparent light (passes through).
- Explain how ultraviolet rays can cause a finish or substance to deteriorate.
- Demonstrate an understanding of refraction in fiber optic systems.
- Explain that dyes added to fluids fluoresce under ultraviolet light and provide a process for determining the source of leakage in a system.
- Explain in detail the three states of matter.
- Explain to a customer how sound can be amplified due to resonant cavities and other physical characteristics of the vehicle.
- Explain and demonstrate an understanding of how sound generated in one place in the body and engine can be carried to other parts of the engine through metal and other materials.
- Explain the need for sound deadening and vibration damping materials to control the level of sound in the passenger compartment.

- Demonstrate an understanding of the relationship of perceived intensity to decibel level of a noise.
- Demonstrate an understanding of the types of vibrations caused by out-of-balance or excessively worn systems.
- Explain and demonstrate an understanding of the role of listening to sounds as part of the trouble-shooting process.
- Explain that the presence of overtones may indicate changes in the vibrations of various systems.
- Demonstrate an understanding of and discuss relative humidity in terms of effect on paint and substance applications.
- Explain how levers and pulleys can be used to increase an applied force or distance.
- Identify the effect of the pH of a solution on chemical changes in a system.
- Identify the characteristics that define a component or system that is operating within the manufacturer's specifications.
- Use precision measuring devices to determine if replaced components are within the manufacturer's specifications, and to assure that repair or replacement parts meet the manufacturer's specifications.
- Use tension gauges, such as a torque wrench, to measure the force or tension required to tighten connections to the manufacturer's specifications.
- Use a scale to measure component weight in order to mix an adhesive or to determine the strength and integrity of a component or part.
- Use pressure measuring tools to determine pressures in hydraulic or pneumatic paint systems and compare to the manufacturer's specifications.
- Use direct and indirect methods to measure system temperatures and then convert to Fahrenheit/Centigrade as required for proper cure and application times.
- Use direct and indirect methods to measure application times and compare the results to the manufacturer's specifications.
- Use direct and indirect methods to measure the volume of liquids in a mixture or compound.
- Use computer databases for information retrieval and input devices to process information for customers, billing purposes, warranty work, and other record-keeping purposes.

- Explain how an applied force at one location can be transmitted via fluid pressure to provide a force at a remote location.
- Explain to the customer the need for lubrication of adjacent parts to minimize friction as a result of movement at the junction of the parts.
- Explain the criticality of metals with different hardness, depending on the function and location of the metal as well as how fillers and finishes adhere to metal.
- Explain the necessity of knowing that the hardness of a metal determines, in part, its function and location in the automobile.
- Explain the dynamic control properties of a hydraulic system.
- Explain the surface processes that occur on system seals due to the absorption of the contained materials.

- Demonstrate an understanding of how torque relates to force and angular acceleration.
- Demonstrate an understanding of how cams, pulleys, and levers are used to multiply force or transfer directions of force.
- Explain how rotational motion is changed to linear motion and the need for balance in rotating systems.
- Demonstrate an understanding of how variances in flow rate will effect operation of pneumatic tools and equipment.
- Explain the dynamic control properties of a hydraulic system in terms of its impact on spray patterns, volume, etc.
- Explain the surface process that occurs on system seals due to absorption of the contained materials.
- Demonstrate an understanding of how a contaminated liquid can cause a chemical reaction which can result in the deterioration of the finish or a plastic component.
- Use precision gauges or instruments to measure the flow rate of air in a painting application.
- Demonstrate an understanding of how variances in flow rate can effect the spray patters, thickness of coat, etc., in the finishing process.
- Correctly use proportions and ratios in mixing fillers, finishes, and other substances.
- Explain the role that acids and bases have in altering compounds used on or in the automobile.

- Understand the use and safety requirements of all solvents used in an automotive application.
- Demonstrate an understanding of how surface processes and cohesive/adhesive forces aid in glues, tapes, and sealants.
- Identify the physical properties of an automobile component or system that are made of glass or plastic.
- Describe or explain the role that activators have in causing a change in the chemical state of a compound or filler.
- Explain fluid viscosity as a measurement and why it is important to the application of fillers, plastics, and finishes.
- Locate and explain the properties of a given source of light.

Electrical/Tolerances

- Explain and demonstrate an understanding of the properties of electricity that impact the lighting, engine management, and other electrical systems in the vehicle.
- Demonstrate an understanding of the characteristics of a quality electrical ground and explain the problems associated with an inadequate electrical circuit ground.
- Explain voltage and current flow in series and parallel circuits.
- Demonstrate an understanding of the processes used to locate a short circuit in the electrical/electronic system.
- Demonstrate an understanding of the role of the alternator in maintaining battery and system voltage.
- Demonstrate an understanding of the role of solar panels in maintaining battery voltage and operating selected accessories.
- Explain and demonstrate an understanding of the ignition coil's role in generating the high voltages required to fire the sparkplug.
- Demonstrate an understanding of the correct procedure used to measure the electrical parameters of voltage, current, resistance, or power.
- Explain and demonstrate an understanding of the role of a fuse or fusible link as a protective device in an electrical or electronic circuit.

- Explain and demonstrate an understanding of the use of Ohm's Law in verifying circuit parameters (resistance, voltage, amperage).
- Explain and demonstrate an understanding of the relationship of resistance to heat, voltage drop, and circuit parameters.
- Explain and demonstrate an understanding of system voltage generation, uses, and characteristics.
- Demonstrate an understanding of the ion transfer process that occurs in an automotive battery.
- Explain the effect of oxidation on electrical connections as well as on an automotive finish.
- Explain the effect of magnetic fields on unshielded circuits and voltages induced in other circuits by the magnetic fields.
- Explain how attaching magnets to an automobile body can cause paint to be evenly distributed through the principles of magnetism.
- Explain the conductivity problems in a circuit when connectors corrode due to electrochemical reactions.
- Explain the relationship between electrical current in a conductor and the magnetic field produced in a coil such as the starter solenoid.
- Explain the ability of a coil to increase battery voltage to the level required to fire a sparkplug.
- Explain the effect of magnetic fields on unshielded circuits in selected control modules.
- Explain the need for a specific gravity test of battery electrolyte to determine charge.
- Use precision electrical test equipment to measure current, voltage, resistance, continuity, and/or power.
- Demonstrate an understanding of the role of capacitance in timer circuits, such as RC timers or MAP sensors, where the changing manifold pressure causes two metal discs to act like a capacitor by sending varying voltage to the electronic engine control system.
- Demonstrate an understanding of the capacity of semiconductor devices to modify rapidly engine operation parameters depending on multiple inputs from engine operational sensors.
- Explain how the movement of a conductor in a magnetic field can generate electricity.

- Demonstrate an understanding of the role of mechanical transducers in sending electrical control signals to modify system operating characteristics.
- Demonstrate an understanding of the purpose of photocells and measurement processes relative to determining output.

WORKPLACE SKILLS

IDENTIFIED AS BEING IMPORTANT BY THE NATEF
COLLISION REPAIR AND REFINISH TECHNICIANS
RELATED ACADEMIC SKILLS COMMITTEE
FROM THE V-TECS/ILLINOIS WORKPLACE SKILLS LIST

A. DEVELOPING AN EMPLOYMENT PLAN

1. Match aptitudes and interest to employment area.
2. Match attitudes to a job area.
3. Match personality type to job area.
4. Match physical capabilities to a job area.
5. Demonstrate a drug-free status.

B. SEEKING AND APPLYING FOR EMPLOYMENT OPPORTUNITIES

1. Locate employment opportunities.
2. Identify job requirements.
3. Locate resources for finding employment.
4. Prepare a resume.
5. Identify conditions for employment.
6. Evaluate job opportunities.
7. Identify steps in applying for a job.
8. Complete job application form.
9. Identify attire for job interview.

C. ACCEPTING EMPLOYMENT

1. Apply for social security number.
2. Complete state and federal tax forms.
3. Accept or reject employment offer.
3. Complete employees withholding allowance certificate Form W-4.

D. COMMUNICATING ON THE JOB

1. Communicate orally with others.
2. Use telephone etiquette.
3. Prepare written communication.
4. Follow written directions.
5. Ask questions about task.

E. INTERPRETING THE ECONOMICS OF WORK

1. Describe responsibilities of employee.
2. Describe responsibilities of employer or management.
3. Investigate opportunities and options for business ownership.
4. Assess entrepreneurship skills.

F. MAINTAINING PROFESSIONALISM

1. Assess business image and products/services.
2. Identify positive behavior.
3. Identify company dress and appearance standards.
4. Participate in meetings.
5. Identify work-related terminology.
6. Identify how to treat people with respect.

G. ADAPTING/COPING WITH CHANGE

1. Identify the elements of the job transition.
2. Formulate transition plan.
3. Exhibit ability to handle stress.
4. Recognize need to change or quit a job.
5. Write a letter of resignation.

H. SOLVING PROBLEMS AND CRITICAL THINKING

1. Identify the problem.
2. Clarify purposes and goals.
3. Identify solutions to the problem and their impact.
4. Employ reasoning skills.
5. Evaluate options.
6. Set priorities.
7. Select and implement a solution to a problem.
8. Evaluate results of implemented options.
9. Organize workloads.
10. Access employer and employee responsibility in solving a problem.

I. MAINTAINING SAFE AND HEALTHY ENVIRONMENT

1. Identify safety and health rules/procedures.
2. Demonstrate the knowledge of equipment in the work place.
3. Identify conservation and environmental practices and policies.
4. Act during emergencies.
5. Maintain work area.
6. Identify hazardous substances in the work place.

J. DEMONSTRATING WORK ETHICS AND BEHAVIOR

1. Identify established rules, regulations and policies.
2. Practice cost effectiveness.
3. Practice time management.
4. Assume responsibility for decisions and actions.
5. Exhibit pride.
6. Display initiative.
7. Demonstrate willingness to learn.
8. Identify the value of maintaining regular attendance.
9. Apply ethical reasoning.

K. DEMONSTRATING TECHNOLOGY LITERACY

1. Demonstrate basic keyboarding skills.
2. Demonstrate basic knowledge of computing.
3. Recognize impact of technological changes on tasks and people.

L. MAINTAINING INTERPERSONAL RELATIONSHIPS

1. Value individual diversity.
2. Respond to praise or criticism.
3. Provide constructive praise or criticism.
4. Channel and control emotional reactions.
5. Resolve conflicts.
6. Display a positive attitude.

M. DEMONSTRATING TEAM WORK

1. Identify style of leadership used in team work.
2. Match team member's skills and group activity.
3. Work with team members.
4. Complete a team task.
5. Evaluate outcomes.

TOOLS AND EQUIPMENT

Local employment opportunities and the availability of funds are key factors for determining the program's structure and operation. This section was developed recognizing that in the majority of programs, all of the tasks and specialty areas cannot be covered. Therefore, the basic philosophy is this: For the tasks which are covered, the training should be as thorough as possible.

The basic tools and equipment the lab/shop and student should have for training in any given specialty area are included in this section. Obviously, many tools and much equipment are the same for some or all of the specialty areas. Some equipment is specialized, however, and must be available in the lab/shop to provide quality training. No specific brand names are identified because they will vary in each local situation.

The student hand tool lists cover all areas, and indicate the tools a student will need to be successful in each of the specialty areas. Industry surveys indicate that most (90%) employers require that a candidate for employment provide his/her own basic hand tool set in order to be hired as an entry level automobile technician.

GENERAL SHOP EQUIPMENT AND SAFETY ITEMS

The tools and equipment on this list are to be available for general shop work. A well equipped, certified program should have all of these general tools and equipment readily available and in sufficient quantity and capacity to provide quality instruction.

GENERAL SHOP EQUIPMENT

Air Blow Guns - OSHA Standard

Air System - Air Compressor
Air Hoses with quick release couplings
Air Lines
Regulator
Water Extractors

Air Transformer/Regulators - at each outlet

Corrosion Protection Application Equipment

Creepers

Exhaust Fans - for each room equipped with electronic dust collectors (as required by OSHA)

Extension Cords

Heat Lamp

Jack Stands

Overhead Ventilation - for welding area

Oxy-acetylene Torch Set - for brazing, cutting, shrinking, and heating

Portable Floodlights

Service Jacks

Storage Cabinets

Trouble/Work Lights - fluorescent preferred

Work Benches - recommended:
3'6" x 7'0" height 2'10", 12-gauge steel top,
2 compartment metal base cabinet with 3 shelves and doors to lock

SPECIAL SAFETY ITEMS

(All equipment must meet or exceed federal, state, and local regulations.)

Ear Protection - for students, instructors, and visitors

Fire Blankets and Case

Fire Extinguishers - by type as required

Eye Wash Basin

OSHA "Right to Know" Compliance Kit - sets procedures for handling hazardous wastes

Paint Storage Locker - meeting fire and building codes

Protective Gloves and Clothing - for handling paint and related chemicals

Safety Cans - for solvents, rags, etc.

Safety Glasses - for students and instructors

Safety Shoes - as required

Safety Shower - as required

Vacuum System - for air sanders

STUDENT HAND TOOLS
CONTAINED IN INDIVIDUAL SETS OR TOOL CRIB
(IN SUFFICIENT QUANTITIES TO PERMIT EFFICIENT INSTRUCTION)

COMMON HAND TOOLS

Adjustable Wrenches - 6" and 12"
Allen Wrench Set - Standard (.050" - 3/8")
Allen Wrench Set - Metric (2mm - 7mm)
Battery Post Cleaner
Battery Terminal Pliers
Battery Terminal Puller
Brake Spoon
Chisels - Cape 5/16"
Cold 3/8", 3/4"
Combination Wrenches - Standard (1/4" - 1")
Metric (7mm - 19mm)
Continuity Test Light (12V)
Crowfoot Wrench Set - Metric
Crowfoot Wrench Set - U.S.

Feeler Gauge (Blade Type) - .002" - .040"
.006mm - .070mm
Flare Nut (tubing) Wrenches - Standard 3/8" - 3/4"
Metric 10mm - 17mm
Flashlight
Hack Saw
Hammers - 16 oz. Ball Peen
Brass
Dead Blow Mallet
Plastic Tip
Sledge
Soft Faced
Rubber Mallet
Ignition Wrench Set - U.S. and Metric
Inspection Mirror
Jumper Wire Set (with various adapters)
Oil Filter Wrench
Pickup Tool - Magnetic and Claw Type
Pliers - Combination
Hose Clamp
Locking Jaw
Needle Nose
Side Cutting
Slip Joint (Water Pump)
Snap Ring Plier Set - internal and external
Punches - Center
Brass Drift
Pin 1/8", 3/16", 1/4", 5/16"
Taper 3/8", 1/2", 5/8"
Safety Glasses - personal
Screwdrivers - Blade Type: Stubby
6"
9"
12"
Offset
- Phillips: Stubby #1, #2
6" #1, #2
12" #3
Offset #2
- Posidrive Set #1, #2, #3, #4
- Torx® Set T-8, T-10, T-15, T-20, T-25, T-27, T-30, T-40, T-50, T-55
Screw Extractor Set
Screw Starter - Phillips
Standard
Socket Sets - 1/4" Drive: 1/4" - 1/2" U.S. Standard Depth
1/4" - 1/2" U.S. Deep
6mm - 12mm Metric Standard Depth
6mm - 12mm Metric Deep
Flex/Universal Type - U.S. and Metric

1/4" Universal Joint
3", 6" Extensions
Ratchet

- 3/8" Drive: 5/16" - 3/4" U.S. Standard Depth (6 point)
3/8" - 3/4" U.S. Deep (6 point)
9mm - 19mm Metric Standard Depth
9mm - 19mm Metric Deep
3", 6", 12", 18" Extensions
Flexhead Ratchet
Impact Sockets - 3/8" - 3/4" U.S. Standard
Impact Sockets - 10mm - 19mm
Impact Wrench
Ratchet
Speed Handle
Universal Joint

- 1/2" Drive: 7/16" - 1 1/8" U.S. Standard Depth
7/16" - 1 1/8" U.S. Deep
10mm - 25mm Metric Standard Depth
10mm - 25mm Metric Deep
5", 10" Extensions
Flex Handle (Breaker Bar)
Impact Sockets U.S. 7/16" - 1 1/8"
Impact Sockets Metric 12mm - 32mm
Impact Wrench
Ratchet

Torque Wrench - 3/8" Drive lb. in. (30 - 250)
3/8" Drive lb. ft. (5 - 75)
1/2" Drive lb. ft. (50 - 250)

Miscellaneous Tools -
- Assorted Sanding Tools
- Caulking Gun
- C-clamp
- Dust Gun
- Hacksaw with blades
- Lug Wrench
- Oil Can (Pump Type)
- Panel Cutters
- Pry Bar Set
- Putty Knife
- Rivet Gun
- Scrapers
- Scratch Awl
- Tap and Die Sets - U.S. and Metric
- Tape Measure - Standard and Metric
- Tin Snips
- Tire Pressure Gauge
- Tool Chests

Twist Drill Sets:
U.S. - 1/64" - 1/4" by 64ths and Metric Equivalent
U.S. - 1/4" - 3/4" by 1/16ths and Metric Equivalent
Wire Brushes

Special Removing and Releasing Tools -
Door hinge spring and pin remover
Miscellaneous interior and exterior trim removing tools
Door handle removing tool
Windshield wiper removing tool

BODY WORKING TOOLS

Assorted files - for metal and plastic finishing, including:
Body Files
Metal Files
Surform® Files

Dollies -
Bumping File
Fender Dolly
Inside Heavy Duty Spoon
Inside High Crown
Inside Medium Crown
Toe Dolly
Universal Dolly

Hammers - assorted body hammers

Picks - assorted

Punches and Chisels - assorted:
Air Chisel Set - various bits
Center Punch
Chisel Gauge
Diamond Point Chisel
Flat Chisels - 1/4" - 3/4"
Long Center Punch
Long Flat Chisels - 1/4" - 3/4"
Long Pin Punches - 1/16" - 3/8"
Long Tapered Punches - 3/8" - 5/8"
Pin Punches - 1/16" - 3/8"
Punch/Chisel Holder
Round Nose Cape Chisel
Short Tapered Punches
Starter Punches - 1/16" - 3/8"

Spreaders and Applicators - assorted types and sizes

ADDITIONAL TOOLS AND EQUIPMENT REQUIRED FOR SPECIALTY AREAS

This section contains a list of the tools and equipment required for each specialty area. These tools are in addition to the General Shop Equipment and Student Hand Tools listed on the previous pages.

STRUCTURAL ANALYSIS AND DAMAGE REPAIR

Everything listed under Non-Structural Analysis and Damage Repair plus:

- Frame/Unibody Straightening Equipment -
  - Bench/rack or floor-mounted system with multiple pull capacity
- Stationary Glass Removal Tools -
  - Hot knife, cold knife, etc.
- Tram and Center-line Datum Gauges
- Universal Measuring System -
  - Incorporating a mechanical (to include Strut Tower Gauge Assembly), laser, or computerized measuring system

NON-STRUCTURAL ANALYSIS AND REPAIR

- Anchoring System
- Car Lift
- MIG Welders and accessories
- Plasma Cutting Torch (recommended)
- Portable Hydraulic Ram with attachments
- Pressure Washer
- Portable Power Tools -
  - Chisels
  - Die Grinder with attachments
  - Drills - 3/8" and 1/2" variable speed, reversible
  - File
  - Grinders
  - Hammer
  - Impact Wrenches
  - Needle Shears
  - Nibbler
  - Ratchets
  - Reciprocating Saw
  - Sanders
  - Screwdrivers
- Pulling and Holding Equipment Set - to include:
  - Body Clamps
  - Cable or Chain Ratchet

- Sill Clamps
- Slide Hammer - complete with attachments
- Stationary Power Tools -
  - Bench Grinder
  - Drill Press (recommended)
- Step Ladder
- Stud Welding Gun
- Vacuum Cleaner
- Welding Safety Equipment - to include:
  - Helmets
  - Gloves
  - Safety Glasses

MECHANICAL AND ELECTRICAL COMPONENTS

- Air-conditioning gauges, leak detector and vacuum pump
- Ball-joint Fork
- Battery Charger - with boost capability
- Brake Bleeder - power assisted
- Chassis Lubricator
- Cooling System Pressure Tester
- Crane/Hoist - portable, 2-ton capacity
- Digital Multimeter (DMM)
- Gear Puller Set - heavy duty with attachments
- Headlight Aiming Equipment
- Hydraulic Press - with adapters
- Pitman Arm Puller
- Reciprocating Saw
- Refrigerant Recovery System - (certified)
- Spring/Strut Compressor Tool
- Spring Compressor
- Tie Rod Puller
- Wheel Alignment System (4-wheel)
- Wheel Balancer

PLASTICS AND ADHESIVES

- Disc Grinder - 3"
- Dremel Grinding Tool Set
- Drills - 3/8" and 1/2" variable speed, reversible
- Heat Gun
- Plastic Welder
- Structural Adhesives Dispenser - two-component

PAINTING AND FINISHING

- Buffer/Polisher - power-driven
- Color-matching Light System
- Enclosed Paint Spray Booth
- Fresh-air Make Up Compressor
- Masking Equipment -
  - Car Covers

Headlight Covers
Lock-cylinder Covers
Paper and Tape Dispenser
Wheel Covers

Mil Thickness Gauge
Paint Mixing and Measuring Equipment
Paint Shaker
Prep Station - (recommended)
Spray Guns - (type to be determined by instructional requirements)

Siphon
Pressure
Gravity-feed
HVLP

Spray Gun Cleaning Equipment